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By-Mahlstede, John P.; Thomas, Robert W.

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RESEARCH AND DEVELOPMENT IN VOCATIONAL AND TECHNICAL EDUCATION: NON-METROPOLITAN AREAS; RESEARCH REPORTS

APPENDIX TWO

June 1968

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RESEARCH AND DEVELOPMENT IN VOCATIONAL AND TECHNICAL EDUCATION: NON-METROPOLITAN AREAS; RESEARCH REPORTS

APPENDIX TWO

John P. Mahlstede
Robert W. Thomas

Iowa State University
Ames, Iowa

June 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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TABLE OF CONTENTS

Page

A. Project 1: The decision-making process of Iowa young adults. A-1

B. Project 2: Vocational education and occupational aspirations of high school students with no college plans. B-1

C. Project 3: Differential non-income occupational valuations of Iowa farm boys. C-1

D. Project 4: Interrelationship of home environment and employment. D-1

E. Project 5: Manpower requirements and demand in agriculture by regions and nationally, with estimation, vocational training and educational needs and productivity. E-1

F. Project 6: The potential contribution of psychology to interdisciplinary research in vocational-technical education. F-1

G. Project 7: An analysis of legal and political problems and the strategy necessary for implementing programs under the Vocational Education Act of 1963. G-1

H. Project 8: Collection of occupational data by skill clusters using a sampling technique. H-1

PREFACE

Appendix two reports research activities under contract O. E. 5-85-108 financed during the period covered by November 30, 1966, to July 1, 1968. Research reports which cover activities under contract O. E. 5-85-108 for the period June, 1965, to December, 1966, are filed in appendix one to this contract.

CAREER DECISION-MAKING PROCESSES OF IOWA YOUNG ADULTS

Project No. 1

Contract No. O. E. 5-85-108

Dean R. Yoesting
George M. Beal
Joe M. Bohlen

May 1968

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Iowa State University of Science and Technology

Ames, Iowa
50010

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	A-1
	A. The Problem	A-2
	B. Review of Literature	A-3
	1. Aspirations versus attainments	A-3
	2. Factors related to migration performance	A-5
	3. Factors related to occupational and educational attainment	A-6
	C. Objectives	A-7
II.	METHODS	A-8
III.	RESULTS	A-10
	A. Migration Expectations and Performances	A-10
	B. Occupational Aspirations and Attainments Analysis	A-16
	1. Variables utilized in correlational analysis	A-16
	2. Correlational analysis	A-17
	3. Occupational aspirations in 1948	A-20
	4. Occupational attainments	A-22
	5. Occupational congruency	A-22
	6. Parents' occupational aspirations for their children	A-23
	C. Post High School Education	A-23
	1. Educational aspirations	A-23
	2. Educational attainment	A-25
	3. Iowa Area Vocational Schools	A-28
IV.	DISCUSSION	A-28
V.	CONCLUSIONS	A-30
VI.	SUMMARY	A-32
	A. Migration - Leaving the Home Communities	A-33
	B. Occupational Aspirations and Attainments	A-34
	C. Post High School Education	A-34
	D. Iowa Area Vocational Schools	A-35
VII.	REFERENCES	A-36

LIST OF TABLES

Page

Table 1. Migration expectations, 1948 A-10

Table 2. Migration performance, 1949 A-11

Table 3. Migration performance, 1956 A-11

Table 4. Migration performance, 1967 A-12

Table 5. 1948 migration intentions by 1967 migration performances A-12

Table 6. 1967 migration performances by sex and 1948 residential background A-13

Table 7. 1967 residence of 1948 high school graduates A-15

Table 8. 1967 community of residence A-16

Table 9. Single variable relationship: independent variable relationship to occupational aspirations A-18

Table 10. Single variable relationship: independent variable relationship to occupational attainment A-19

Table 11. Percentage distribution of occupational aspirations in 1948 and occupation attained in 1967 for female respondents A-20

Table 12. Percentage distribution of occupational aspirations in 1948 and occupation attained in 1967 for female respondents A-21

Table 13. Intended to go to college, 1948 A-24

Table 14. Post high school education, 1967 A-25

Table 15. Type of advanced education pursued by respondents A-26

Table 16. College intentions in 1948 by educational attainment in 1967 A-26

Table 17. Migration performance by educational attainment A-27

CAREER DECISION-MAKING PROCESSES OF IOWA YOUNG ADULTS

I. Introduction

There has been an increasing amount of attention on the part of social scientists and public leaders concerning the educational and occupational orientations of youth. With the far-reaching changes in United States agriculture and the effects these changes are having on rural people, it is important to understand the factors which enter into the career decision making of youth.

Each year thousands of youth complete their formal education and enter the labor market. With the changing rural scene, higher levels of economic opportunities in nonfarm areas, and the increasing participation of rural youth in advanced education, has come a high degree of out-migration from rural areas. These changes have produced the expected rural to urban migration from most rural areas of the United States.

As youth approach graduation from high school, they are faced with important career decisions. They are confronted with numerous alternatives from which they must choose. These choices will play a very important role in determining the future course of their lives. For most practical purposes, the career decision-making process is irreversible.

Several alternatives available to youth completing public education have immediate relevance. They must decide whether to continue their education beyond high school, complete their military obligation, or enter the labor market. If they decide to enter the labor market, the decision is usually permanent in the case of most males in that they will continue to be employed in the labor market, and temporary in the case of most females in that they will probably marry and become full-time housewives. In addition to this decision, these youth must answer many other questions. What kinds of occupations would be the most interesting and rewarding? What kinds of occupations are available? Which occupations are reasonable career alternatives, given personal circumstances and capabilities? Would more education be necessary to enable the achievement of the desired career alternative? Is it possible to obtain additional education? Will leaving the home community and family increase the chances of career success?

These decisions, which probably start to take place early in a youth's life, are of great importance to an individual, but also should be of concern to society as a whole; because one of the great problems of modern complex societies is to develop and arrange the distribution of its human resources to fulfill the occupational demands of society.

Our society places strong emphasis on freedom of choice, but it must make available the information, the opportunities and the rewards necessary to enable wise decisions on the part of the individual. If these factors are made available, then the choice made by an individual should allow him to make maximum use of his talents and provide him with the personal satisfaction he desires.

It is fairly well accepted that an open society, as it theoretically exists in the United States, enables an individual to get ahead if he so desires. Nevertheless, it also is known that there are certain social, economic and personal situations and factors which influence one's desire to select certain alternatives and then to achieve that choice. With a greater understanding of these variables, it may be possible to improve the chances of making the free choice system operate better for youth than it has in the past. This may be at least partially achieved by enabling the youth to understand the changing labor market structure and by providing counselors more knowledge in directing young people toward needed careers in modern society.

A. The Problem

A large amount of research has been conducted in recent years concerning the occupational and educational aspirations of youth, and the volume continues to grow.(25,26,32) Many of these studies have evolved from the assumption that aspirations of youth are a crucial or, at least, a highly important determinant of subsequent educational and occupational attainments.(9) These studies have been concerned with the aspirations of high school students in regard to the education and occupation they desire, but few studies have actually analyzed the relationship between aspirations and the amount of education and the types of occupations attained.(3)

There is a legitimate reason for the lack of longitudinal studies to measure the educational and occupational attainment of these youth. Such projects require extended lengths of time between studies to enable an accurate observation of the occupational patterns. The major problem occurs, however, because the occupational and educational structure of the society is constantly changing, and these studies would only enable inferences as to the decision-making process now in existence.

A needed area of research is to determine the factors, capable of measurement at the time students are ready to graduate from high school, which are related to attainment. If these variables can be isolated, then more significant variables can be used in predicting the relationship between educational and occupational aspirations and attainments.

The longitudinal nature of this study eliminates the problems of recall on the part of respondents over extended periods of time. It also allows the determination of more precise factors that may better predict the potential of goal attainment. In general, most researchers assume that aspirations are related to attainment. Therefore, it is necessary to determine what relationships exist and also what factors can best predict behavior in terms of goal attainments.

B. Review of Literature

1. Aspirations versus attainments. Few studies have been reported that deal directly with the nature and extent of the relationship between educational and occupational aspirations and later attainment in adult life. Not only are few studies available but even fewer are available based on a longitudinal analysis.

Of the limited studies reported, three were completed more than 20 years ago and have many serious limitations.(2,31,44) These studies have limited utility in attempting to provide information in deriving hypotheses except to note that there was weak or no support for a relationship between occupational aspirations and later occupational attainment.

A more recent study was reported in 1954 by Porter(30) and was specifically designed to determine the relationship between occupational expectations and attainment. The author found that 79 percent of the graduating seniors followed the plans they had expected to follow while seniors. The study was conducted with a six months interval between interview dates. This is a major limitation of the study because it is difficult to substantiate any concrete relationship between aspirations and attainment with a study design of such short duration.

By using longitudinal data, Haller(17) found partial support for Lipset's(28) hypothesis that the level of occupational achievement was positively correlated with the level of educational and occupational aspirations. He found a zero order correlation of +.46 between the level of occupational attainment and level of occupational aspiration. From these findings of a seven-year restudy of 431 males, Haller concluded that the levels of occupational attainments in adult life are substantially influenced by levels of occupational aspirations in youth.(16)

Sewell, Haller and Portes recently completed a seven-year restudy of a sample of Wisconsin high school seniors concerning the educational and occupational attainments of a random subsample of the original sample.(18,38) In this study, the authors found a zero order correlation of +.38 between educational aspirations and occupational attainments, +.61 between educational aspirations and educational attainment, and +.70 between educational aspirations and occupational aspirations. Between occupational aspirations and occupational attainment a correlation of +.43 was found, and a correlation of +.53 was found between occupational aspirations and educational attainment.

The authors concluded that substantial confirmation to the prediction of a strong positive link between educational aspirations and educational attainments and between occupational aspirations and occupational attainments is evident. They did hasten to stress that "though aspirational variables were the main determinants of attainment, they were not the only ones."(38,pp. 32-33) In addition, educational attainments appeared to have the greatest single effect on occupational attainment.

Another relevant study was reported by Kuvlesky and Bealer(24) using a sample of 1001 high school sophomore males interviewed in 1947 concerning their occupational aspirations and reinterviewed in 1957 concerning their occupational attainments. The authors found that an occupation in the professional category was the most aspired to occupation, followed closely by farming and skilled work. After a ten-year period, they found that 23 percent of the young men attained the occupation goal aspired to in 1947, but the percentage who attained their occupational goal varied by occupation categories. With a word of caution, they indicated that aspirations of rural youth did not seem to be a good predictive device for long-range occupational attainment.(24) Had the sample been interviewed while seniors, the relationship might have been stronger.

Kohout and Rothney,(23) reporting the results of a ten-year longitudinal study of 321 Wisconsin high school senior males, found that approximately 14 percent of the respondents were employed in the occupational category which they had specified ten years earlier. In a five-year study of these same respondents the authors reported slightly higher rates of congruence between aspirations and attainments than existed after ten years, especially for those aspiring to professions and farming.

Since each of these researchers used a different type of analysis, it is difficult to compare the various studies directly. As a consequence of the various study designs, the authors interpreted their results differently. Sewell and Haller indicated that aspirations had an influence on attainments in adult life, but their correlations, even though statistically significant, were not extremely high. Kuvlesky and Bealer, and Kohout and Rothney on the other hand, stated that their studies did not give strong support to the hypothesis that occupational aspirations were a good predictor of occupational attainments.

2. *Factors related to migration performance*. Previous studies have indicated that migrants from rural areas differ from nonmigrants in a number of important characteristics. In discussing the factors related to migration of rural youth to urban centers, Bowles (8) indicated that migrants differ from nonmigrants as to age, sex, color, marital status, education, income and employment. She also indicated that the aspirations held by rural youths lead to dissatisfaction with rural areas and thus caused a high degree of migration from rural areas.

Taves(42) indicated that one of the most thoroughly established demographic principles is that rural-urban migration selects persons on the threshold of adult life, and selects females in somewhat greater numbers than males. Specifically, the greatest amount of out-migration occurs between the ages of 16 and 25 with females having a higher rate than males. After age 27, the mobility rate for males exceeds that of females until age 55, when the rates for the sexes merge.(1,29,35) Farm residents are the least mobile of all residential groups, and the difference between farm and other residential categories increases with age.

In considering the place of residence orientation, researchers found that a larger proportion of females than males aspired to move away from their home communities. A greater proportion of farm females than nonfarm females planned to migrate, but no difference existed between rural nonfarm and farm males.(12,35,50) Kuvlesky found that a significantly greater proportion of white females than white males desired residence in urban areas. Among Negroes, a greater proportion of females than males desired an urban residence but the difference was not statistically significant.(27)

Past research has indicated that females tend to migrate greater distances than males. Allen, et. al., (1) indicated that males were more likely than females to be classified as stay-at-homes. The females tended to be more mobile, with a large proportion migrating from their home community but still residing within their home county. Persons with nonfarm backgrounds tended to leave the county more frequently than farm residents. Taves and Coller, on the other hand, found that the distance of migration was not related to residential background.

In a series of Indiana studies, high educational attainments, high social status and a greater amount of knowledge concerning available jobs were found to be related to migration.(11,15,33) It would appear that high school seniors who had high socio-economic backgrounds, frequently discussed their future plans with their parents, and had aspirations to pursue additional education beyond high school, would be more likely to migrate from their home communities.

There seems to be a general relationship between spatial mobility and the types of occupations entered but no conclusive evidence is available. The authors of an Iowa study concluded that the lowest levels of occupational achievement were observed among farm-to-urban males, urban non-migrants were next and urban-migrant males had the highest levels of occupational achievement.(10) Though much of the variation was associated with educational differences, the differences between migration types still remained. In a Des Moines study, when age and educational levels were controlled, differences in occupational attainment by migration categories of farm-urban, urban-urban, and urban non-migrants became nonsignificant.(5)

Other studies support the generalization that, on the average, rural migrants to the city are less successful than urban-reared persons in achieving higher occupational status. These include Beers and Heflin,(6) Freedman and Freedman,(14) and Shannon.(40) Lipset indicated that the smaller the community of orientation, the more likely the individual was to have spent a considerable portion of his work career in manual occupations. The distinction does not occur between the classic rural and urban delineation, but between rural and urban to 250,000 population versus urban population over 250,000.(28)

In considering the relationship between migration and occupational aspirations, Taves and Coller found that there was a greater tendency for rural males aspiring to professional than to blue-collar occupations to migrate.(42) However, Schwarzweller found no significant differences between rural migrants and rural non-migrants and occupational aspirations of the respondents.(34)

3. Factors related to occupational and educational attainment. Present occupational decision-making theory is derived mainly from studies of occupational aspirations. Since there is a moderate relationship between occupational aspiration levels and occupational attainment levels, it is assumed that variables related to aspirations are related to attainment.

Many factors seem to be related to occupational choices. The sex of the individual is an important characteristic in influencing occupational aspirations. The opportunities ascribed to different sexes, what is expected of the different sexes and the socialization influences are reflected in different patterns of occupational aspirations. Compared with females, a significantly greater proportion of males choose higher status occupations.(34) There is inconclusive evidence concerning the relationship between sex and educational plans.

It has been found that residence is related to occupational and educational aspirations.(1,9) Rural youth generally have lower levels of aspirations than rural nonfarm and urban youth. Farm males who remain at home are more likely to be employed in farming or blue-collar occupations.

Past research findings indicated that males planning to farm had fewer plans to continue their education beyond high school than males not planning to farm. If these males ever decide to discontinue farming and enter a nonfarm occupation, their chances of attaining a high status occupation would be limited because of their poor educational backgrounds. Because they fail to see the educational requirements for success in the nonfarm occupational world as relevant to themselves, they tend to isolate themselves from information concerning other types of occupational alternatives, know less about the occupational world, and are enrolled in fewer non-agricultural courses, than males not planning to farm.(9,16,18) In addition, males who have farm backgrounds but have no plans to farm tend to have lower educational and occupational aspirations than rural nonfarm and urban youth.

Educational and occupational aspiration levels of youth are highly related to the social status background of their parents. Youths from higher status families more frequently plan to attend college and aspire to higher status occupations.(13,35,41,49)

Parents' educational aspirations for their children are highly related to the plans youth have for themselves. In addition, the frequency of discussion of future plans with parents has generally been related to the occupational and educational aspirations.(13,41) Therefore, parents are extremely important reference groups for high school seniors.

C. Objectives

In the study reported in this report the researchers sought to accomplish five objectives:

1. To determine the relationship between migration, occupational and educational aspirations of high school seniors and their attainment in adult life.

2. To determine the differences in career patterns that exist between males and females.

3. To determine the differences in career patterns between farm and nonfarm residents.

4. To determine the relationships between social and personal characteristics of young adults and their occupational and educational attainments.

5. To determine the relationships between migration performance and social and personal characteristics of the young adults.

Data from this investigation should be useful to counselors as well as to researchers interested in occupational and educational aspirations of youth.

II. METHODS

The data for this study have been gathered at three points of time. The benchmark data were obtained in 1948 from graduating high school senior males and females from the eight rural high schools in Hamilton County, Iowa, and from Story City High School in adjoining Story County. Story County not only adjoins Hamilton County but also is similar in regard to ethnic and other cultural factors.

Hamilton County and the northwest portion of Story County are located in the North Central grain area of Iowa. The area is one of the richest agricultural counties in the Midwest with most of the economy based on the production of livestock and corn. The county is basically rural; the largest city being Webster City with a 1950 population of 7,611 and a 1960 population of 8,520. Hamilton County was one of the typical cornbelt counties selected by the U.S.D.A., Bureau of Agricultural Economics, Division of Farm Population.(22)

The nine high schools studied were located in towns of from 100 to 1,800 population. The largest high school had 130 students enrolled and the smallest high school had an enrollment of 53 students. There were 157 respondents in the first study.

The data for the benchmark study were obtained by having each senior class assemble as a group with each student completing his own questionnaire. The same interviewer visited all schools and acted as proctor in explaining the mechanics of the questionnaire. He read each question in order, allowing the student to complete that question before the next question was read. Data concerning background characteristics, intentions to migrate, job experiences, occupational and educational aspirations, parent-child relationships and respondents' attitudes toward farming were gathered and analyzed. A check of these same respondents was made one year later with the school administration to determine the actual migration patterns of the respondents.

A major follow-up of the benchmark study was completed in 1956. With this time span, it was felt that the respondents could achieve an occupation choice and geographic location of a more permanent nature. For this phase of the study, data were gathered by personal interview (87%) where possible; however, a special modification of the interview schedule was prepared for mailing (13%) when personal interviews were impossible. No statistically significant differences were found between those who answered personal interviews and mailed questionnaires.

Data in the 1956 study included migration performance, occupational and educational histories and achievements, attitudes toward farming, and perceptions of goal attainment as expressed in 1948. Of the 157 who were included in the first study, 152 completed schedules in the 1956 study.

The second major follow-up study of the same respondents was completed in the spring of 1967. It was assumed that most of the respondents had completed their training beyond high school and their military service had been completed for all those not planning a military career. It also was assumed that the respondents' occupations and places of residence would be of a more permanent nature.

Data for this phase were gathered by mailed questionnaire, except for approximately 20 schedules completed by personal interview. Data obtained included occupational and educational attainments, migration performance, family characteristics, occupational and educational aspirations for their children, perceptions of Iowa's Area Vocational School programs, and perceptions of aspirations indicated in 1948. There were 143 completed schedules in the 1967 study; these being the ones utilized in the data analysis.

The data were coded and analyzed for a preliminary report(48) and a series of articles.(7,19,45,46,47) The preliminary report presented frequency distributions for migration, occupational and educational variables. This report was mailed to all respondents. The articles written have analyzed: (1) variables related to 1956 migration performance; (2) variables related to congruency between 1948 occupational aspirations and 1956 attainments; (3) variables related to 1967 migration performance and migration congruency; (4) variables related to congruency between 1948 occupational aspirations and 1967 occupational attainments; and (5) sociodemographic characteristics as related to parental occupational aspirations for their children. One Masters of Science thesis has been completed(43) and another is in process.(4) Statistics used included chi-square, differences of means, analysis of variance and product moment correlations. Some of these data are presented in the results section of this report.

III. RESULTS

A. Migration Expectations and Performances

One of the major objectives of this longitudinal study was to determine the migration patterns of individuals. According to the census figures of 1960, Iowa was undergoing a population redistribution. In general, rural areas throughout Iowa have been and are subject to high out-migration.

The aggregate data of migration expectations and performances over the past 19 years indicate a general trend of increasing numbers of persons migrating from their home communities after graduation. The greatest number of respondents migrated within one year of graduation from high school with a considerable number migrating from and returning to their home communities.

In observing the 1948 migration intentions, 36 percent were undecided concerning migration from their home communities, 51 percent intended to migrate and 13 percent planned to remain in their home communities. (See Table 1.) Considerable differences existed between the males and females concerning migration intentions. Greater proportions of the females than males expected to migrate and larger proportions of males were undecided concerning migration expectations.

Table 1

Migration Expectations, 1948

	Males		Females		Total	
	No.	%	No.	%	No.	%
Leave	20	32.8	53	64.6	73	51.0
Stay	13	21.3	5	6.1	18	12.6
Undecided	28	45.9	24	29.3	52	36.4
Total	61	100.0	82	100.0	143	100.0

In 1949, data showed that approximately one-half of the males and four-fifths of the females had actually left their home communities, while over half of the males and one-fifth of the females remained. (See Table 2.)

Table 2

Migration Performance, 1949

	Males		Females		Total	
	No.	%	No.	%	No.	%
Leave	28	45.9	66	80.5	94	65.7
Stay	33	54.1	16	19.5	49	34.3
Total	61	100.0	82	100.0	143	100.0

The 1956 data indicated that 62 percent of the respondents were residing outside their home communities. (See Table 3.) This was a slight decrease from the percentage of respondents living away from home in 1949. The same proportion of males resided in their home communities in both 1949 and 1956, thus a number of female respondents migrated from their home communities soon after graduation but they had returned by the time of the 1956 study. This change is partially accounted for by females who went to work and returned when they married men from the local area.

Table 3

Migration Performance, 1956

	Males		Females		Total	
	No.	%	No.	%	No.	%
Leave	28	45.9	61	74.4	89	62.2
Stay	33	54.1	21	25.6	54	37.8
Total	61	100.0	82	100.0	143	100.0

By 1967, a considerably larger percentage of respondents had migrated from their home communities. (See Table 4.) Data indicated that 75 percent of the respondents resided in communities other than the ones in which they lived while seniors in high school. This included 62 percent of the males and 84 percent of the females. This large number residing outside their home communities stresses the desire of respondents to pursue opportunities elsewhere.

Table 4

Migration Performance, 1967

	Males		Females		Total	
	No.	%	No.	%	No.	%
Leave	38	62.3	69	84.1	107	74.8
Stay	23	37.7	13	15.9	36	25.2
Total	61	100.0	82	100.0	143	100.0

In comparing 1948 migration intentions and 1967 migration performance, 40 percent of those undecided in 1948 were residing in their home communities in 1967, while nearly 60 percent had migrated. (See Table 5.) Of the males who were undecided, 50 percent left and 50 percent remained in their home communities. Among the females, 71 percent of those who were undecided migrated and 29 percent resided within their home communities. Over 50 percent of the total sample expected to leave their home communities upon graduation, and nearly 90 percent of these achieved their goal. Of those expecting to remain in their home communities, less than 40 percent remained.

Table 5

1948 Migration Intentions by 1967 Migration Performances

1948 Migration Intentions	1967 Migration Actions					
	Stay		Leave		Total	
	No.	%	No.	%	No.	%
Leave	8	11.0	65	89.0	73	51.0
Stay	7	38.9	11	61.1	18	12.6
Undecided	21	40.4	31	59.6	52	36.4
Total	36	25.2	107	74.8	143	100.0

Since researchers attempt to determine which individuals will remain in or migrate from their home communities from data gathered prior to migration, an attempt was made to determine which variables are related to actual migration performance. It was hypothesized that in 1967, more females than males would have migrated from their home communities and that more graduates with nonfarm backgrounds would have migrated than those with farm backgrounds. Data in Table 6 indicate migration performance by sex and residential background.

Table 6

1967 Migration Performances by Sex and 1948 Residential Background

1948 Residence and Sex	1967 Migration Performance Stay No.	Stay %	Leave No.	Leave %	Total No.	Total %
Farm	25	29.1	61	70.9	86	60.1
Male	17	45.9	20	54.1	37	43.0
Female	8	16.3	41	83.7	49	57.0
Non-farm	11	19.3	46	80.7	57	39.9
Male	6	25.0	18	75.0	24	42.1
Female	5	15.2	28	84.8	33	57.9
Total	36	25.2	107	74.8	143	100.0

Chi-square tests indicated no statistically significant relationship between 1948 residential background and migration performance. A relationship at the .01 level of statistical significance was found between migration performance and sex. A greater proportion of females (84percent) than males (62 percent) migrated from their parental home.

It was hypothesized that socio-economic background is directly related to migration performance.(37) Chi-square tests indicated no statistically significant relationship between high and low socio-economic scores and migration performance.

Another characteristic hypothesized to be related to migration performance was the frequency of discussion of future plans with parents. It was hypothesized that seniors who frequently discussed their plans with their parents would be more likely to migrate than those who infrequently discuss future plans. Chi-square tests revealed a statistically significant relationship at the .10 level of significance between the degree of discussion with parents and actual migration. The relationship was in the hypothesized direction.

The college aspirations of high school seniors have extensively been used as independent variables in studies of migration expectations and occupational aspirations. It was hypothesized that those who had college aspirations would be more likely to migrate than those with no college aspirations. Data strongly support this hypothesis. The relationship between college aspirations and migration performance was significant at the .01 level of significance, thus rejecting the null hypothesis of no relationship.

The type of occupation in which the respondent was employed in 1965 was hypothesized to be related to migration performance. Chi-square tests indicated a significant relationship at the .001 level between migration performance and whether the males were employed in white-collar, blue-collar or farming occupations. Those males who left their home communities were more likely to be found in white-collar occupations, while those who remained were more likely to be farming. No meaningful relationship could be determined for the females because 60 percent were not employed in the labor force in 1967.

Data from this study support previous research that migration from rural areas takes place soon after graduation and at a faster rate for females than for males. Among the female respondents, over 50 percent migrated within one year of graduation, approximately 33 percent migrated between 1950 and 1957, and the remaining 16 percent were living in their home communities at the time of the 1967 study. All females who migrated from and presently reside outside their home communities migrated prior to 1958.

The males presented a much different trend. Approximately 25 percent of the males migrated within one year of graduation, another 30 percent migrated between 1950 and 1957, and approximately 8 percent migrated between 1958 and 1967.

In observing the 1967 geographic distribution of respondents, 38 percent of the males and only 16 percent of the females resided in the communities in which they lived when they were seniors in high school. (See Table 7.) Data indicated that 36 percent of the females and 57 percent of the males resided in their home counties, while 72 percent of the females and 84 percent of the males resided in Iowa. These data indicate that approximately 23 percent of the respondents resided outside Iowa. A much larger proportion of the females than males have migrated from their home communities, and they also have migrated greater distances from home than the boys.

Table 7

1967 Residence of 1948 High School Graduates

1967 Residence	Female No.	Female %	Male No.	Male %	Total No.	Total %
Home community	13	15.9	23	37.7	36	25.1
Home county	17	20.6	12	19.7	29	20.3
Contiguous county	16	19.5	6	9.8	22	15.4
Other counties in Iowa	13	15.9	10	16.4	23	16.4
Contiguous states	9	11.0	3	4.9	12	8.4
Other states	14	17.1	7	11.5	21	14.7
Total	82	57.3	61	42.7	143	100.0

In comparing the 1956 data with the 1967 data, fewer persons were residing in their home communities at the later date, a change of from one-third to one-fourth of the respondents. Only slightly more persons resided outside Iowa in 1967 than resided outside in 1956. Over time, the respondents established a more permanent residence than had existed immediately after high school graduation.

In analyzing the community of residence of the respondents in 1967, 38 percent of the males and 26 percent of the females resided on farms. (See Table 8.) In contrast, 26 percent of the males and 33 percent of the females resided in cities larger than 10,000 population. The data lends support to previous research.

Table 8

1967 Community of Residence

	Males		Females		Total	
	No.	%	No.	%	No.	%
Farm	23	37.8	21	25.6	44	30.7
Open-country, but not farm	3	4.9	4	4.9	7	4.9
Village under 2500	16	26.2	18	22.0	34	23.8
Town 2500-10,000	3	4.9	12	14.6	15	10.5
City over 10,000	16	26.2	27	32.9	43	30.1
Total	61	100.0	82	100.0	143	100.0

B. Occupational Aspirations and Attainments Analysis

1. Variables utilized in correlational analysis. In this study the dependent variable, level of occupational aspirations (X_1), was operationalized with data obtained in 1948 by assigning North-Hatt prestige scores(20) to the occupation given as first choice that the respondents would best like to achieve when they completed their education.

Level of occupational attainment (X_2) was measured by assigning North-Hatt prestige scores to the occupation held by the male and single female respondents and the husbands of the married females in 1967. This also was a dependent variable.

Level of educational aspirations (X_3) is a trichotomous variable corresponding to the respondent's indication in 1948 of planning to continue education(1), not planning to continue education(2), or undecided concerning educational plans(3).

Level of educational attainment (X_4) was measured with data from 1967 by dividing the sample into those with a college degree(3), those who attended college but did not receive a degree(2), and those who obtained no additional education beyond high school(1).

Migration expectations (X_5) were measured in 1948 by dividing the sample into categories of those who expected to migrate from their home communities(1), those who expected to reside in their home communities(2) and those who were undecided concerning migration intentions(3).

Migration performance (X_6) was measured with data obtained in 1967 by categorizing the respondents into those who were residing in their home communities at the time of the data collection(2) and those residing outside their home communities at the time of data collection(1).

Residential background (X_7) is a dichotomous variable corresponding to the 1948 indication of a farm(1) or nonfarm residence(2).

Frequency of discussion of future plans with parents (X_8) was measured by data collected in 1948. Respondents indicated frequent discussion(1), infrequent discussion(2) and no discussion(3).

Fathers' education (X_9) and mothers' education (X_{10}) were measured by the actual years of education indicated by respondents in 1948.

Fathers' occupation (X_{11}) was measured by classifying occupation indicated by respondents in 1948. The occupational categories corresponded to census classifications (professional occupations, 1 to laborer, 11).

Socio-economic status background (X_{12}) of the respondents was measured by the utilization of Sewell's short form scale of socio-economic status. The scores ranged from 61-85, with the high score equal to high socio-economic status. The data were gathered in 1948.

Work outside of high school (X_{13}) was determined in 1948 by respondents indicating whether(1) or not(2) they had summer or weekend employment while in high school.

2. Correlational analysis. Table 9 shows the correlations attained between the independent variables and the 1948 occupational aspirations of the respondents. (See Table 9.) Only three of the variables indicated a statistically significant difference at the .05 level with occupational aspirations scores. These included educational attainment, educational aspirations, and mothers' education. Even though these variables were statistically significant, the amount of variance explained was quite low. Except for mothers' education, none of the environmental factors indicated significant relationships to occupational aspirations.

Table 9

Single Variable Relationship: Independent Variable Relationship to Occupational Aspirations

	Occupational Aspirations*	
Variable Name	r	r^2
X_3 Educational Aspirations	-.244***	.060
X_4 Educational Attainments	.356**	.127
X_5 Migration Expectations	-.149	.022
X_6 Migration Performance	.170	.029
X_7 Residential Background	-.166	.026
X_8 Discussion with Parents	-.065	.004
X_9 Fathers' Educations	.047	.002
X_{10} Mothers' Educations	.213**	.045
X_{11} Fathers' Occupations	-.140	.020
X_{12} Socio-economic Background	.143	.020
X_{13} Work Outside High School	-.014	.000

*N = 123 excludes no datas
** = .05 level of significance
*** = .01 level of significance

In observing the correlational analysis between the independent variables and occupational attainment, more significant and stronger relationships were found than existed between independent variables and occupational aspirations. (See Table 10.) Variables found to be related to occupational attainments at the .05 level of significance included migration performance, and at the .01 level of significance were educational aspirations, educational attainment, occupational aspirations, fathers' educations, mothers' educations and socio-economic background.

Table 10

Single Variable Relationship: Independent Variable Relationship to Occupational Attainments

Variable Name	Occupational Attainments*	
	r	r^2
X_2 Occupational Aspirations	.340***	.116
X_3 Educational Aspirations	-.230***	.053
X_4 Educational Attainments	.518***	.268
X_5 Migration Expectations	-.134	.018
X_6 Migration Performance	.189**	.036
X_7 Residential Background	-.050	.003
X_8 Discussion with Parents	-.019	.000
X_9 Fathers' Educations	.273***	.075
X_{10} Mothers' Educations	.263***	.069
X_{11} Fathers' Occupations	-.068	.005
X_{12} Socio-economic Background	.258***	.067
X_{13} Work Outside High School	-.014	.000

*N = 139 excludes no datas
** = .05 level of significance
*** = .01 level of significance

An important implication can be made from a comparison of these two tables. Keeping in mind that the occupational attainment scores included the husband's occupation in case of married females, we can infer that the attainment of occupations is more highly related to socio-economic background (environmental) variables of the parental families than are the occupational goals (aspirations) these youth hope to achieve. Previous research has indicated that aspirations of youth generally are much higher than is possible to attain and the youth therefore end up being employed in lower status occupations. Data from this longitudinal study strongly support these findings.

3. Occupational aspirations in 1948. In analyzing the 1948 occupational aspirations by sex and residential background, with the exception of farm males, respondents aspired more frequently to occupations in the professional occupational category than those in any other category. (See Tables 11 and 12.) Approximately 38 percent of the entire sample aspired to professional occupations; 25 percent of the males and 48 percent of the females aspired to occupations in this category.

Table 11

Percentage Distribution of Occupational Aspirations in 1948 and Occupation Attained in 1967 for Male Respondents

Occupational Category	Aspirations-1948 Farm (37)	Aspirations-1948 Nonfarm (24)	Aspirations-1948 Total (61)	Attainments-1967 Farm (37)	Attainments-1967 Nonfarm (24)	Attainments-1967 Total (61)
	%	%	%	%	%	%
Professionals	16	38	25	14	46	26
Farmers	57	0	34	51	0	31
Managers	0	0	0	8	17	12
Sales	0	0	0	11	4	8
Craftsmen	8	21	13	5	17	10
Operatives	3	0	2	3	4	3
Service workers	0	0	0	0	8	3
Laborers	0	4	2	0	0	0
Military service	0	0	0	3	0	2
No data	16	37	24	5	4	5
Total	100	100	100	100	100	100

Among the farm males, 57 percent aspired to farming as an occupation, 16 percent aspired to professional occupations, and 8 percent had a craftsmen occupation as a goal. Approximately 17 percent indicated no occupational preference.

For the nonfarm males, 38 percent aspired to professional occupations, 21 percent to craftsmen and 4 percent to laborers category. No nonfarm males aspired to farming as an occupation. Thirty-eight percent were undecided concerning desired occupational goal.

Table 12

Percentage Distribution of Occupational Aspirations in 1948 and Occupation Attained in 1967 for Female Respondents

	Aspirations-1948			Attainments-1967		
Occupational Category	Farm (37)	Nonfarm (24)	Total (61)	Farm (37)	Nonfarm (24)	Total (61)
	%	%	%	%	%	%
Professional	49	46	47	14	9	12
Managers	0	0	0	6	0	4
Clerical	35	30	33	10	15	12
Sales	0	0	0	4	6	5
Operatives	0	0	0	0	3	1
Service workers	4	12	7	4	3	4
Laborers	0	0	0	8	0	5
Housewives	6	0	4	54	64	57
No Data	6	12	9	0	0	0
Total	100	100	100	100	100	100

The occupational aspirations of the farm and nonfarm females showed great similarities. Professional occupations were the most aspired to (48 percent), while 33 percent aspired to clerical occupations, 7 percent to service occupations and 4 percent to housewives. Approximately 10 percent gave no indication of occupational aspirations.

The proportion of the high school seniors aspiring to professional occupations was more than six times greater than the proportion of their fathers holding professional occupations. Only 3 percent of the fathers of males and 9 percent of the fathers of females held professional occupations in 1948.

4. Occupational attainments. In 1967 the occupation of each respondent was determined and classified into the same categories used for occupational aspirations. The data indicated that approximately the same proportion of males attained professional, farm and craftsmen occupations as there were in each of the aspired occupational categories. Though none of the males aspired to be managers, salesmen or service workers, a number were employed in such occupations. (See Table 11.) This does not indicate that all males achieved their desired occupation. On the contrary, approximately 39 percent of the male respondents achieved an occupation in the same occupational category as that to which they had aspired.

Among the females, a much different situation exists. (See Table 12.) Even though 47 percent of the females aspired to professional occupations, only 12 percent were employed in occupations in this category in 1967. Approximately three times as many females aspired to clerical occupations as achieved these occupations. Obviously, marriage was an intervening variable in limiting the number of females presently employed in any type of occupation. Approximately 60 percent were full-time housewives and thus not employed in the labor force. These data substantiate the fact that many females view their entrance into the labor force as a temporary situation. In 1967, only 17 percent of the females held the occupation they aspired to in 1948.

5. Occupational congruency. There have been a number of variables that have been related to the occupational choices of rural youth.(9) These variables can be grouped into three major categories: 1) the social situation in which the respondents found themselves while in high school, 2) the reference groups to which students were oriented, and 3) the characteristics of the respondents. The assumption was made that since these factors have been found to be related to occupational aspirations, they should be related to the agreement (congruency) between occupational aspirations and attainments.

Factors used to measure the social situation of the respondents included residential background of the respondents, socio-economic status background and the educational backgrounds of the mothers and fathers. Chi-square tests (population divided by sex) between each of these variables and the degree of congruency yielded no statistical significances for all variables, except for females fathers' education. A statistically significant relationship at the .001 level was found; those females whose fathers had high educational attainment were more congruent than those whose fathers had low levels of educational attainment.

The measure of the reference group category included the respondents' frequent or infrequent discussion of future plans with parents. No significant relationship was found between occupational congruency and frequency of discussion for males or females.

One characteristic of the respondents indicated that, for females, statistically significant differences at the .05 level were found between college attendance and the degree of congruency. No differences were found for males.

There was a statistically significant difference at the .001 level between the degree of congruency and the sex of the respondents. A much greater proportion of males than females achieved their occupational aspirations. However, the large number of females not employed in an occupation (housewives) should be kept in mind.

6. Parents occupational aspirations for their children. Parents appear to play an important role in influencing their children, but few studies have analyzed the factors related with the parents' occupational aspirations for the child. Analysis of the data indicated that the respondents sex, residential background and parents' occupational attainments were not related to the North-Hatt prestige scores of the occupations parents aspired for their oldest child. Significant relationships at the .05 level were found between parents' occupational aspirations for their children and the educational attainment of the parents, and parents' aspirations for their children and the migration performance of the parents.

C. Post High School Education

1. Educational aspirations. In 1948 all respondents were asked to indicate the amount of education they hoped to achieve. (See Table 13.) At that time, 31 percent of the males and 37 percent of the females indicated plans to further their educations. Thirty-one percent of the males and 33 percent of the females had no intentions to continue their educations, and 38 percent of the males and 31 percent of the females were undecided concerning their educational goals.

Table 13

Intended to go to College, 1948

	Males		Females		Total	
	No.	%	No.	%	No.	%
Yes	19	31.1	30	36.6	49	34.3
No	19	31.1	27	32.9	46	32.2
Undecided	23	37.8	25	30.5	48	33.5
Total	61	100.0	82	100.0	143	100.0

Chi-square tests were performed on a series of independent variables to determine their relationship to educational aspirations. The amount of education aspired to by respondents was trichotomized into those who planned to continue their education, those who had no plans to continue their education and those who were undecided concerning educational plans. The independent variables utilized include sex, residential background, socio-economic status background, discussion of future plans with parents, fathers' education, and mothers' education.

Chi-square tests revealed no statistically significant differences between college aspirations and the sex of the respondent, or between college aspirations and the residential background. Statistically significant differences at the .05 level were found between educational aspirations and the socio-economic background and the education of the respondents' mothers. Those with high socio-economic background and mothers with high educational attainment (12 years of school or more) were more likely to aspire to additional education beyond high school.

Statistically significant differences at the .01 level were found between educational aspirations and fathers' education and aspirations and the discussion of future plans with parents. Respondents whose fathers had nine or more years of education were more likely to aspire to a college education than those fathers with eight or less years of education. Those respondents who aspired to additional education were more likely to have frequently discussed their future plans with parents than those with no educational plans or those who were undecided concerning additional education.

2. Educational attainment. In 1967 the respondents were asked to indicate their post high school education. (See Table 14.) This education included all forms, such as college or university, beauty school, business school, nurses training and junior college. Fifty-one percent of the females and 33 percent of the males had some type of advanced education beyond high school.

Table 14

Post High School Education, 1967

	Males		Females		Total	
	No.	%	No.	%	No.	%
Yes	20	32.8	42	51.2	62	43.4
No	41	67.2	40	48.8	81	56.6
Total	61	100.0	82	100.0	143	100.0

In comparing the 1948 educational aspirations with 1967 attainments, 59 percent of the males and 56 percent of the females were congruent with aspirations; i.e., they either aspired to additional education and attained it, or they planned no additional training and received no additional education.

What kind of education did the respondents receive? Data in Table 15 indicate the type of educational institutions attended. All 20 males who obtained additional education attended a college or university, while half of the females attended a college or university and the other half attended a junior college, business school or received nurses training.

Table 15

Type of Advanced Education Pursued by Respondents

	Males		Females		Total	
	No.	%	No.	%	No.	%
College or university	18	29.5	19	23.2	37	25.9
Junior college	0	0.0	11	13.4	11	7.7
Business school	0	0.0	7	8.5	7	4.9
Nurses training	0	0.0	3	3.7	3	2.1
Both junior college and college or university	2	3.3	2	2.4	4	2.8
No advanced education	41	67.2	40	48.8	81	56.6
Total	61	100.0	82	100.0	143	100.0

Table 16 shows the strong relationship between intentions to continue an education and ultimately receiving a college degree. Of those who received a degree, 86 percent had intended to continue

Table 16

College Intentions in 1948 by Educational Attainment in 1967

	Educational Attainment							
College Intentions in 1948	High School Only		Some College		College Degree		Total	
	No.	%	No.	%	No.	%	No.	%
Yes	6	7.4	17	53.1	25	86.3	48	33.8
No	39	48.2	4	12.5	3	10.3	46	32.4
Undecided	36	44.4	11	34.4	1	3.4	48	33.8
Total	81	57.0	32	22.6	29	20.4	142	100.0

their educations and of those who obtained some training, 53 percent had plans to continue their education beyond high school. Those who were undecided concerning intentions, generally had no additional education and only one undecided individual of those actually received a college degree.

The brain drain from our rural communities is very evident from data in this study. The county, though supported by an excellent agricultural base, is basically rural, with relatively few nonagricultural occupations available. Data in Table 17 indicate whether the 1967 community of residence was the same as the 1948 residence by educational category. Thirty-one of the 36 respondents who reside in their home communities in 1967 have only a high school education. Of the 61 who obtained at least some additional education beyond high school, only 5 resided in their home communities.

Table 17

Migration Performance by Educational Attainment

	Educational Attainment							
1967 Migration Performance	High School Only No.	%	Some College No.	%	College Degree No.	%	Total No.	%
Stay	31	38.3	3	9.4	2	6.9	36	25.4
Leave	50	61.7	29	90.6	27	93.1	106	74.6
Total	81	57.0	32	22.6	29	20.4	142	100.0

What factors appear to be related to educational attainment? Chi-square tests were performed between 1967 educational attainment and a series of independent variables. No statistically significant relationships were found between educational attainment and the frequency of discussion about future plans with parents or 1948 residential background.

Chi-square tests revealed statistically significant relationships at the .05 level between educational attainment and socio-economic background, and at the .01 level for fathers' and mothers' educational background. The sex of the respondent also was related to educational attainment at the .01 level of statistical significance.

3. Iowa Area Vocational Schools. A series of questions were asked in the 1967 study pertaining to the awareness of and reaction of the respondents toward the Iowa Area Vocational School Program. Approximately one-fourth of the respondents were not Iowa residents and did not respond to the questions. Of the 109 Iowa residents who responded to the questions, 74 percent indicated that they had heard of the area vocational schools. Of those who were aware of the educational system, 80 percent first became aware of it through mass media and 90 percent had seen articles concerning the area vocational schools in their newspapers. Approximately half of those who were aware of the area schools had personally talked to someone about the schools.

When those who were aware of the program were asked how they felt about the area vocational school programs, 74 percent approved, 4 percent disapproved, and 22 percent were undecided about their feelings. Only 38 percent indicated that their friends approved of the program, 56 percent did not know what their friends felt concerning area vocational schools and 6 percent indicated their friends disapproved.

Few of the respondents were aware of specific vocational courses that were available to adults. Only 23 percent indicated specific courses available, while 77 percent could not indicate specific courses. One-third of the respondents did indicate though, that they would consider attending an area vocational school to upgrade their present skill level or to seek a new job.

A hypothetical situation was developed to determine the respondents' advice to a recent high school graduate "who neither expresses an interest nor has demonstrated the scholastic ability to attend a four-year college". Nearly 60 percent of the respondents indicated that the boy should attend a state supported vocational technical school and 30 percent indicated he should get involved in an apprentice program for a skilled job.

When a similar hypothetical situation was developed for the girls, nearly 82 percent said they would recommend a state vocational-technical school for first preference and 11 percent indicated a private vocational-technical school. When a second preference was indicated the private vocational school was overhwelmingly selected for the girls.

IV. DISCUSSION

An analysis of the data collected in this study indicates that aspirations indicated by respondents, whether migration, occupational or educational, play an important role in the attainment of these goals. Of those who made a decision concerning migration, a very high degree of congruency was achieved, especially those who planned to migrate. Of those who were undecided, a much more difficult task is presented in attempting to predict the migration performance.

The findings indicate that certain occupations have more predictive power than others, and the degree of congruency for males is much greater than for females. The occupations aspired to by the females are viewed as a temporary entry into the labor force until marriage. Marriage therefore appears to be an intervening variable limiting the number of females pursuing any type of occupations. As compared to the review of literature discussed in this report, the correlation between aspirations and attainments is slightly lower than indicated by previous research, while the percentage of respondents who indicated congruency is considerably higher than has been found previously. The length of time between interviews may have an influence on the increased level of consistency.

The correlation between educational aspirations and attainments was the highest among aspirations to attainments variables. The data indicated that aspirations to continue education was highly related to attainment of a college degree. A greater proportion of males than females received college degrees; among males, a much greater proportion with nonfarm backgrounds than farm backgrounds received degrees. Among females the reverse was true. A much greater proportion of farm females than nonfarm females received degrees. The data strongly support previous research that farm males have much lower levels of educational aspirations and attainments than any other sex-residence categories.

Considerable support for hypotheses for migration performance was evident. Background variables including sex, frequency of discussion with parents and college aspirations were related to migration performance. The 1967 occupations of the males in the sample and the educational attainment of all respondents also was related to migration performance, but the socio-economic background and residence background indicated no relationship. Because of the lack of occupational opportunities available within their home communities most respondents, regardless of their socio-economic or residential background must seek opportunities elsewhere.

The variables related to migration performance were in the expected direction. Those with college aspirations must leave their home community to achieve their goal and in only a few cases did those who attained additional education return home. A larger proportion of males than females remained in the home communities and over half of these remained to farm. In many cases the females remained because their husbands were farming in the local community.

The correlational analysis of relationships between the dependent variables of occupational aspirations and attainments and the independent variables yielded some important implications. The analysis indicated that occupational attainments was more closely related to socio-economic background variables of the parental families than occupational aspirations of these youth related to the same socio-economic background variables. Previous research has indicated that aspirations of youth are generally much higher than is logically possible to achieve, and therefore lower levels of occupations are attained. The ability of an individual to move up the social status scale, even in an open class society as the United States, is apparently difficult in that occupational attainment is closely related to the youths' backgrounds.

Analysis revealed that educational aspirations, socio-economic background, sex, and the mothers' and fathers' educational attainments were related to educational attainment. As with occupational attainment, the 1948 residential background yielded no relationship to educational attainment. These data again indicate the importance of one's background situation in attainment of educational goals beyond high school.

There were limitations in this study. The results seem to indicate that the residential background of the respondents is not a discriminating variable. The variable was dichotomized into farm and nonfarm residence categories, but with the lack of an urban sample, concrete evidence of the affect of residence is limited.

The longitudinal nature of this study, though it has numerous advantages, also has its limitations. With the dynamic nature of the occupational and educational structure of the nation, the form of the decision-making process could have changed so drastically that inferences to those preparing to enter occupations should be made with caution. This does not mean that longitudinal studies should not be completed, because as results of this and other longitudinal studies have indicated, aspirations apparently play a role in influencing the levels of migration, educational and occupational attainments in youth.

V. CONCLUSIONS

The migration patterns of the sample under discussion conform to data from previous research. The longitudinal data indicates the general trend of increasing numbers of persons migrating from their home communities after graduation. The greatest number of people migrated one year after high school graduation. There was though, considerable migration out of and back to the home communities.

When youth have made a decision concerning their migration goal, an extremely large proportion of these youth achieve their goal, especially if they planned to migrate from their home communities. Of those who were undecided concerning migration, it is difficult to determine whether or not they would migrate.

Greater proportions of females than males migrated from their home communities, but for females the residential background did not affect migration performance. Farm males were much more likely to remain at home than nonfarm males because of the farming opportunities available.

Those who migrated from their home communities were more likely to have frequently discussed their future plans with their parents, and had aspirations to continue their education beyond high school. The socio-economic background was not related to migration performance.

Correlational analysis of two dependent variables, occupational aspirations and occupational attainments, with a series of independent variables indicated limited relationships with aspirations but more significant relationships with attainments. Of the background variables only mothers' educational background and educational aspirations yielded significant results with occupational aspirations.

The correlational analysis between occupational attainments and the independent variables yielded significant correlations with educational aspirations, occupational aspirations, fathers' and mothers' educational background, and socio-economic background of the respondents. These data indicate the importance of one's environmental background in determining the occupation attained and the lack of importance of the environmental background in influencing aspirations.

These data have important implications as to the role researchers should place on occupational aspirations to determine occupation attainments. This relationship does not appear to have a strong influence; for the male, 39 percent attained the occupation desired, but only 17 percent of the females attained their aspired occupational goal.

The data analyzed in this report offer little encouragement to communities who would like their educated youth to return to the rural communities. Extremely small proportions of the youth who attained additional education beyond high school returned to their home communities. There was a strong relationship between educational aspirations and the attainment of a college degree. Thus, those who aspired additional education were almost sure to reside outside their home communities. Those with the least amount of education were more likely to remain in their home communities and farm or be employed in blue-collar occupations.

The relationship between migration expectations and performances and between educational aspirations and attainments were much stronger than between occupational aspirations and attainments. Though occupational aspirations do influence attainments for males, little relationship exists for females. With better measurements of occupational aspirations and attainments, stronger relationships may be found, and especially for females who may return to work after their families have matured.

VI. SUMMARY

This project was undertaken in order to obtain a better understanding of the influence that aspirations of high school youth have on attainments in adult life. The research focused on three major aspects of the career decision-making process: 1) migrating from the home community, 2) obtaining additional education beyond high school, and 3) choosing an occupation.

In 1948, 157 graduating high school seniors from nine rural high schools in the north central grain region of Iowa were personally interviewed concerning their background characteristics, migration expectations from their home communities, and their occupational and educational aspirations. In 1956, 152 of the initial respondents were again personally interviewed to determine personal characteristics, migration performance, the occupations attained and the amount of education achieved to that time. Again in 1967, 143 of the original sample were interviewed by mailed questionnaire concerning personal characteristics, migration performance, educational and occupational attainments and perceptions of the new Iowa Area Vocational-Technical School program.

The major objectives of the study were to determine the relationships between migration, occupational and educational aspirations of high school seniors and their attainments in adult life; to determine the differences in career patterns between males and females, farm and nonfarm residential backgrounds; and to determine the relationships between the social and personal characteristics of young adults and their migration performance, occupational attainments and educational achievements.

The data were used to compute chi-square and correlations tests. A number of significant differences were found in the data collected from 1) those who migrated from their home communities and those who did not leave their home communities, 2) those who aspired to continue their education and those with no educational aspirations, 3) those who attained additional education after high school and those who did not attain any additional education, and 4) those who attained high status occupations and those who attained lower status occupations.

The findings substantiate the following generalizations grouped according to that aspect of the career decision-making process which they help explain. The aspirations data was expressed in 1948 by the respondents, and the attainments data were gathered in 1967.

A. Migration - Leaving the Home Communities

1. Compared with males, greater proportions of females expected to migrate from their home communities.
2. Greater proportions of males than females were undecided concerning their migration expectations.
3. A greater proportion of females than males had migrated from their home communities 19 years after graduation.
4. Propensity to migrate was essentially the same for farm and nonfarm females.
5. Propensity to migrate was greater for nonfarm males than for farm males.
6. Propensity to migrate was not related to socio-economic background of the youth.
7. A greater proportion of the youth who discussed their future plans with their parents left their home communities than those who infrequently discussed their future plans.
8. Those who aspired to continue their education beyond high school were more likely to migrate than those with no intentions to continue their education.
9. Males who migrated from their home community were more likely to be employed in white-collar occupations than in farming or other blue-collar occupations.
10. Compared with males, females migrated at a faster rate after graduation.
11. Compared with females, greater proportions of males resided on farms 19 years after high school graduation.

B. Occupational Aspirations and Attainments

1. Significant relationships were found between occupational aspirations of the youth and mothers' educational background, educational aspirations and educational attainments.

2. No significant relationships were found between occupational aspirations of the youth and residential background, socio-economic background, fathers' educational background, fathers' 1948 occupation, and the frequency of discussion of future plans with parents.

3. Significant relationships were found between the occupations attained by the young adults and their socio-economic background, fathers' education, mothers' education, migration performance, occupational aspirations, educational aspirations and educational attainments.

4. No significant relationships were found between occupational attainments and residential background, fathers' 1948 occupations, and frequency of discussion of future plans with parents.

5. Single variable relationships (r) provided relatively small amounts of the explained variance (r^2).

6. Compared with females, greater proportions of males attained the occupations they had aspired to at the time they were seniors in high school.

7. Parents' occupational aspirations for their children were related to the parents' educational background and the migration performance of the parents.

8. Parents' occupational aspirations for their children were not related to the sex of the respondent, residential background of the parents and occupational attainments of the parents.

C. Post High School Education

1. Propensity to obtain additional education beyond high school was essentially the same for males and females.

2. Propensity to obtain additional education beyond high school was essentially for farm and nonfarm youth.

3. Youth with higher socio-economic backgrounds were more likely to aspire to and attain additional education beyond high school than those with lower socio-economic backgrounds.

4. Youth whose parents had higher educational attainments were more likely to aspire to and attain additional education beyond high school than those whose parents had lower educational attainments.

5. Youth who frequently discussed their future plans with parents were more likely to aspire to additional education beyond high school than those who infrequently discussed their future plans, but no relationship was found between educational attainment and frequency of discussion with parents.

6. As compared to males, greater proportions of females attained additional education beyond high school.

7. Of those who received college degrees, greater proportions of the youth aspired to continue their education than had no intentions or were undecided concerning additional education.

8. Greater proportions of those who had additional education beyond high school resided outside their home communities than resided within their home communities.

D. Iowa Area Vocational Schools

1. Most Iowa respondents were aware of the Iowa Area Vocational Program.

2. Iowa respondents became aware of the Iowa Area Vocational Program through mass media.

3. The majority of the Iowa respondents were favorable toward the Vocational Programs.

4. The majority of the Iowa respondents were not familiar with the specific courses available to adults.

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The objectives of this paper were to determine the relationships between migration, occupational and educational aspirations of high school seniors and their attainments in adult life; to determine differences in career patterns between males and females, farm and nonfarm residential backgrounds; and to determine the relationships between the social and personal characteristics of young adults and their migration performances, occupational performances and educational achievements.

The benchmark study was conducted in 1948 when the respondents were seniors in nine rural high schools in north central Iowa. The aspirations and background characteristics were collected from 157 seniors at that time. These same respondents were reinterviewed in 1956 and again in 1967 concerning their attainments at those times. There were 152 respondents in the 1956 study and 143 in the 1967 study.

The data indicated that greater proportions of females than males migrated from home communities. The propensity to migrate was not related to socio-economic or residential background, but it was related to discussion of future plans with parents, educational aspirations and occupational attainment. Males had a higher degree of congruency between occupational aspirations and attainments than females. Occupational attainments were related to socio-economic background, parents' education, migration performance and educational aspirations and attainments. Approximately one-third of the respondents attained additional education beyond high school.

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VOCATIONAL EDUCATION AND OCCUPATIONAL ASPIRATIONS OF HIGH SCHOOL STUDENTS WITH NO COLLEGE PLANS

Project No. 2
Contract No. O. E. 6-85-108

George M. Beal
John J. Hartman

May 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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50010

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	B-1
	A. The Problems	B-1
	B. Review of Related Research	B-2
	C. Objectives	B-4
II.	METHOD	B-4
	A. Sample Selection	B-4
	B. Questionnaire Construction	B-5
	C. Statistical Analysis	B-6
III.	RESULTS	B-6
IV.	DISCUSSION	B-11
V.	CONCLUSIONS	B-11
VI.	SUMMARY	B-12
VII.	REFERENCES	B-13

I. INTRODUCTION

A. Problem

A number of studies have been completed concerning the occupational and educational aspirations and plans of rural youth. The great majority of these studies have concentrated on decision making regarding those youth planning to attend college. The present study focuses on those students who for one reason or another have no plans to attend college. They may not have the motivation or capacity to attend college, or they may lack the necessary financial support or resources to obtain a college education. In their decision-making process these students have alternatives available such as serving their military obligation, going immediately to work or obtaining some kind of vocational technical education or training. The general consensus is that most of those who do not attend college go to work. Also, it is believed that some students who choose to go to college more realistically should go into vocational education and training.

This study explores the occupational and educational decision-making process of 835 male high school seniors with particular emphasis on those who do not plan to attend college. It attempts to answer a number of questions. What is the nature of the high school counseling process? What is the range of educational and occupational alternatives perceived by graduating seniors? What image do they have of various occupations? What are the sources of information concerning occupations available and utilized by high school students? What do they know about necessary training for specific occupational careers? What do they know about the work world of vocational occupations? What are their perceptions of the rewards and advancements in alternative occupations? What do they perceive the occupational structure to be in 1970-1975? Data also will be obtained regarding the knowledge of vocational educational opportunities provided by the new vocational area schools in Iowa.

The new Area Vocational School district arrangement in Iowa made it possible to examine many of the above questions in a comparative framework. That is, the study will focus on differences, if any, between male senior youth who plan one of the following alternatives after graduation from high school:

1) to seek immediate employment

2) to attend a trade or Area Vocational School

3) to attend a four-year college in a degree program

4) to go into the military service.

B. Review of Related Research

Some studies have correlated "place of residence" with aspirations of the respondents.(8,9) In some studies residence has been dichotomized into farm-nonfarm categories. Farm parents seem to be less involved in their sons' occupational plans. It may be that small town and urban parents live and work in environments that place emphasis on preparing for occupations of one's choosing. Many of these parents left farm homes themselves and made the transition to nonfarm life and work. Most farm parents have not gone through the farm to nonfarm transition and the resulting adjustment in their life and work patterns. The parents generally have not had the background of experience in nonfarm job selection and the necessary educational training(3). Bauder(2) concluded that farm migrants have the lowest level of educational and occupational aspirations for their children. He also found that "better" educated people leave their present residences for a larger population center in search of a better job. This would suggest that the larger the population center, the "better" educated the people, and the higher aspirations for their children.

Both rural youths and their parents underestimate the importance of education in achieving an occupation(11). Youmans(13) feels there is a growing need to discover and identify the factors associated with the educational attainment of rural youth and to assess which of these can be influences to bring about higher educational achievement for them.

Wilkening(12) concluded that a majority of farmers felt a high school education was desirable for farm boys, but less than one-fifth felt a college education was necessary. Burchinal(4) found that one-third of the boys planning to farm, compared with over one-half of the boys planning nonfarm careers, indicated that their fathers thought the boys should continue their education after high school. About 14 percent of the boys planning to farm and 6 percent of the boys planning nonfarm jobs said that their fathers thought the boys should go to work immediately after high school. Over half of the boys who planned to farm and two-fifths of the other boys reported that their fathers never said much to them about educational plans. The boys' reports of their mothers' education views followed approximately the same pattern.

Only a small portion of the farm parents made their occupational hopes known to their sons. Kaldor(10) found that only one-fourth of the farm boys believed their fathers had a job in mind for which they thought their sons should plan. About the same percentage held true for the mothers. Among the fathers who did have a career in mind for their sons, slightly less than half wanted their sons to farm. For the fathers who wanted their sons to farm, almost three-fourths of the sons were planning to farm, and for the fathers who wanted their sons to enter a nonfarm occupation, over three-fourths were planning a nonfarm occupation. Of the mothers who had a career in mind for their sons, less than one-third wanted their sons to farm. In the majority of cases it was found that the parents who had an occupation in mind for their sons were similar to the plans the boys actually had in mind for themselves(7).

In the same study, less than one-tenth of the boys who planned to farm indicated that their fathers wanted them to enter a nonfarm occupation. Similarly, five percent of the boys who planned to enter a nonfarm occupation said that their fathers wanted them to farm.

When asked the greatest source of influence regarding occupational plans, 78 percent of the boys planning to farm reported that work-on-the-job was the most important. Sixty-seven percent thought parents were influential. Of the boys planning nonfarm occupations, 47 percent thought their parents were the most influential. The boys planning to farm attached greater importance to being close to relatives(5). Gist(6) found that farm boys are less apt to migrate than are nonfarm boys. If they do migrate they tended to move shorter distances from home than those seeking nonfarm occupations.

In summary, previous research studies relating occupational aspirations to residence and migration appear to agree that farm parents have not had the background of experience in nonfarm job selection, and as a result fewer than one-half of the parents are involved in, and have made fewer plans for, their childrens' occupations. A majority of farmers feel a high school education is necessary, but less than one-fifth feel a college education is necessary. As a result, they tend to underestimate the importance of college education in achieving a nonfarm occupation, and less than one-fifth feel a college education may be an asset. Even so, farm parents exercise a good deal of influence, as two-thirds of the farm boys who plan to farm, and one-half of the farm boys planning nonfarm occupations, indicate their parents are the most influential factor in choosing farming as an occupation.

Bauder(1,2) and Burchinal(3,5) also suggest that most parents who have left farms and small town communities have made the transition to an envirnoment placing an emphasis on special training or education in preparing for occupations. As a result, they will place a higher value on education and be more likely to have definite occupational aspirations for their children. Bauder(2) also suggests that the better educated individuals will leave current residences in search of a larger community and a better job.

The articles from which these positions were drawn are presented in the References section of this report. Many research efforts have attempted to relate socio-demographic characteristics to young people's occupational and educational aspirations. In general, most studies have shown that residence (farm-nonfarm) is an important factor in a youth's vocational-educational decision. An anomaly exists in the position that parents exert a great deal of influence on their children's decisions and at the same time have not given much thought to nor are they aware of many alternatives.

C. Objectives

The objectives of this study were to examine youth soon to graduate from high school to see if there are differences between those planning to attend college and those who do not. More specifically the following are the objectives of this study:

1. To determine the educational and occupational decisions and the decision-making process of high school students, with emphasis on those without college plans.

2. To determine the range of occupational alternatives perceived to be available by high school students.

3. To determine the awareness and knowledge of high school seniors regarding vocational education and training available and the sources of information used in obtaining this information.

II. METHODS

A. Sample Selection

A sample of Iowa high school senior males was drawn from four selected Area Vocational School Districts. These four districts were selected due to the fact that each has a vocational technical school. Almost all other Area Vocational Districts and vocational technical training schools are organized in conjunction with a community or junior college. These four districts were selected because of the interest in measuring knowledge and plans in relation to vocational technical schools. Another limitation was placed on the size of community from which the sample was drawn within the individual Area Vocational District boundary. All centers of over 10,000 population were excluded from the sample since information was sought for a non-metropolitan sample.

All local school districts within each of the four Area Vocational School Districts were rank ordered by size of the senior high school enrollment. All schools in each Area Vocational District were rank ordered into groups of three starting with the three largest schools in each district. This procedure was continued until all local school districts in all four Area Vocational School Districts had been rank ordered. By random procedure one district was selected from each cluster of three districts for each Area Vocational District. This procedure produced seven local school districts for each Area Vocational District or a total of 28 possible local school districts. No provision was made for replacement districts, and ultimately responses were obtained from all 28 districts.

Although school districts were selected in the sampling technique, students are the major unit of analysis and statistical tests will be computed using the total sample of students from the 28 local districts. Selected comparisons will also be made among the four Area Vocational Districts. No identification or examination will be made of the 28 individual local districts. All senior males present on the day of interview were interviewed in a group interview setting. No provision was made for interviewing those not present or available on the day interviewing was scheduled for an individual school. All selected districts participated in the survey and a total of 835 individual student questionnaires were obtained.

B. Questionnaire Construction

A questionnaire was constructed and pretested before administration to the sample. Although the youth responded to the questionnaire in a group setting (senior males were usually assembled in a large room), each individual filled in a separate questionnaire.

The instrument consists of 49 questions aimed at providing information about knowledge of area vocational schools; plans for immediate and long-range educational and occupational plans; real versus desired choice of occupation if money, ability and time were not limiting factors; information on training requirements and starting salary for selected occupations; and attitudes and orientations toward work, time, change, physical labor, geographical mobility and education.

The questionnaire was designed and the pretest indicated that the information could be collected within the one-period variance of school period limits (50-60 minutes).

C. Statistical Analysis

Preliminary data analysis is underway and will consist of frequency distributions for each of the questions and scales. Selected quantified variables will be subjected to correlations, analysis of variance and X^2 tests as appropriate. (The tests will focus on differences, if any, between Area Vocational School Districts, size categories of the individual school districts, differences between the university bound and non-college bound [those going to work, vocational-technical school, military and apprenticeship programs] will be separated and examined under the latter category.)

III. TENTATIVE RESULTS

Since analysis has not been completed selected items (questions) from an approximately one-eighth sample (100) of the 835 interviewed were examined. Hence, these results are considered tentative, but somewhat indicative of the range for the variables examined. A random number was selected and each eighth schedule was drawn until a sample of 100 had been obtained.

Slightly more than two-thirds (68%) planned to obtain more formal education. Relatively few planned to go to work immediately (15%) and 5 percent stated they were undecided in their plans for next year. Almost the same percentage (65%) said that additional

Table 1

Student Educational-Vocational Plans for Year Following High School

	No.	%
Continue going to school	68	68
To get a job	11	11
To become an apprentice	1	1
To go into the military service	11	11
To work for my parents	4	4
Have no definite plans	5	5
Other	0	0
Total	100	100

education was necessary for the work they planned to enter. Only 10 percent said further education was unnecessary, and the remaining 25 percent said additional education was desirable.

Table 2

Student Perception of Necessity of Additional Education Beyond High School

	No.	%
Necessary	65	65
Desirable	25	25
Unnecessary	10	10
Total	100	100

When asked what kind of school they planned to attend, the greatest percent, 32 percent, responded that they would attend a four-year college or university. Thirty-one percent indicated they planned to attend vocational schools, both public and private. These figures are shown in Table 3. Many more youth had considered attending vocational school (67%) than actually planned to attend (31%). Many of those who responded that they had not considered

Table 3

Student Plans for Type of School

	No.	%
Four-year college or university	32	32
Junior college or community college	18	18
Area public vocational school	24	24
Private vocational school	7	7
Other (a)	3	3
Not applicable (did not plan to attend school)	16	16
Total	100	100

(a) Air Force school, conservation school, commercial business school

Table 4

Student Response to Whether They Have Considered Taking Vocational Training

	No.	%
Yes	67	67
No and no response	33	33
Total	100	100

attending vocational schools had heard of the area vocational schools in Iowa. Eighty-seven percent said they had heard of these schools and the community college programs. Not all who had heard of the programs felt they had sufficient knowledge to decide whether to attend the area vocational schools. However, about two-thirds felt they had sufficient knowledge to help make the decision.

Table 5

Student Response to Whether They Had Heard of Iowa Area Vocational or Community College Programs

	No.	%
Yes	87	87
No and no data	13	13
Total	100	100

Table 6

Student Response to: Do You Feel You Have Adequate Knowledge Concerning the Area Vocational School to Help You Decide Whether or Not You Want to Attend?

	No.	%
Yes	64	64
No	34	34
No data	2	2
Total	100	100

Information was sought on the social status ranking of the occupation the students would like to enter if ability, cost, and amount of training were of no concern. These occupations were then ranked on a modified North-Hatt occupational scale. The original North-Hatt scale ranks occupations from a low of 33 (bootblack) to a high of 96 (supreme court justice). The respondents' specified desired occupations ranging from 47 (factory laborer) to 93 (physician). The median occupation desired fell in the 76 status score ranking (represented by occupations such as farmer, high level management positions, and higher ownership positions in small businesses). The students were then asked to give the occupation they thought they would probably enter. These responses also were scored on the modified North-Hatt scale. Some decrease in the scale scores was noted in this more realistic expression of probable occupation of entry. However, it should be noted that some occupations require time to be attained. Hence, lesser scale scores of entrance should be expected even if many youth mention higher status occupations they would like to hold if there were no restrictions. The range of probable occupational entrance was from 47 (factory laborer) to a high of 86 (various scientific and professional positions). The median entrance score was in the 73 (represented by occupations such as higher skilled trades and various technical positions) status prestige score. Since no statistical tests were computed no statement of significance can be made, but there was a reduction in the occupations they thought they would enter from some of the more prestigious occupations given when encumbrances were not considered.

Respondents were asked if they planned to enter the same occupation as their father. Only 8 percent said that they did, 72 percent would not and 20 percent were undecided. In addition, all

Table 7

Student Responses to Whether They Plan to Choose the Same Occupation as Their Father

	No.	%
Yes	8	8
No	72	72
Undecided	20	20
Total	100	100

respondents wanted to be at least as successful as their fathers--two-thirds wanted to be more successful. Further, the students were asked which of the factors shown in Table 9 were most important in

Table 8

In Comparison With Your Father, How Successful Would You Like to Be?

	No.	%
Less successful	0	0
As successful	33	33
More successful	67	67
Total	100	100

Table 9

Which of the Following Would You Consider to be Most Important in Comparing Your Success With That of Your Father?

	No.	%
Income	45	45
Community standing	14	14
Work satisfaction	38	38
Other (a)	2	2
Total	100	100

(a) all of above no "other" listed

comparing their success with that of their father. Income was most important for 45 percent of the respondents, 38 percent stated work satisfaction and 14 percent, community standing.

These tentative and preliminary results give some indication of some of the kinds of data available and some indication of the trends for the total sample of 835.

IV. DISCUSSION

Any meaningful discussion representative of the entire sample and range of findings must await completion of the data analysis.

V. CONCLUSIONS

Preliminary results indicate that most youth have given some thought to their educational and occupational plans beyond high school. There was some tendency to engage in fantasy choices when asked which occupation they would enter if time, money, etc., were not considered. This discrepancy was relatively minor in the sub-sample examined in the tentative results section. Students want to be as successful as their father and two-thirds of them want to be more successful.

Further, most of the students are aware of the area vocational schools and about two-thirds of them feel they have sufficient information about these schools to decide whether they want to attend and 31 percent stated they planned to attend an area vocational school.

Data for this project have been collected from 835 senior high males in 28 school districts. The data represent a stratified random sample of high school senior males from the four Area Vocational School Districts that are autonomous vocational technical schools. All other Iowa Area Vocational Districts are combined with community or junior college districts. Hence, the influence of and knowledge about the area vocational school would have been somewhat more difficult to measure under these conditions.

VI. SUMMARY

The present state of analysis prevents a summary of results of this study. The data are undergoing tabulation and statistical analysis for tests of significance between those going on to college and those attending Area Vocational schools or who plan no further education beyond high school. This analysis and publication of findings will be carried out by Iowa State University after the termination of this contract.

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PERSONAL AUTHOR(S)
Beal, George M., Hartman, John J.

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ABSTRACT

Iowa high school senior males were interviewed to explore the occupational educational decision making of non-college bound youth. A questionnaire was constructed and administered to 835 Iowa senior boys in 28 high schools. The 28 schools are comprized of 7 schools from 4 Area Vocational School Districts. These 4 Area Vocational School Districts were selected because they are free-standing vocational technical schools, not programs in conjunction with community or junior colleges.

Preliminary results indicate that these Iowa youth aspire to an expected range of occupations, but aspirations are higher if the youth respond to a desired occupation with no encumbrance of time, money, ability. Most youth are aware of the Area Vocational School Program (87%) and most (64%) feel they have sufficient information to decide whether they want to attend these schools. Thirty-one percent said they plan to attend vocational-technical schools both public and private. Two-thirds of the youth said they wanted to be more successful than their father and only 8 percent intended to choose the same occupation as their father.

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DIFFERENTIAL NON-INCOME OCCUPATIONAL VALUATIONS OF IOWA FARM BOYS

Project No. 3
Contract No. O. E. 5-85-108

From Material Submitted by

Donald R. Kaldor

As Edited by

Robert W. Thomas

June 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Iowa State University of Science and Technology

Ames, Iowa
50010

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	C-1
II.	METHOD	C-1
III.	RESULTS	C-1
IV.	DISCUSSION	C-1
V.	CONCLUSIONS	C-2
VI.	SUMMARY	C-3
VII.	REFERENCES	C-3

I. INTRODUCTION

Technological and economic forces have been reducing opportunities for farm boys to enter farming and to earn incomes comparable to those offered by many nonfarm occupations. As a result, many have been leaving the farm to seek employment in farm-related and urban-oriented industries. In the future, these numbers will probably increase. However, many industries are demanding workers with a higher level of skill and training. If farm boys are to compete for nonfarm jobs, many will need better preparation for the future than was obtained for the past. For this to happen, there must be adequate opportunity for post-high school training. Also farm boys must take advantage of this training.

An earlier study added to knowledge:

(1) of the determinants of post-high school educational and occupational choices of farm boys,

(2) of the processes used in making post-high school educational choices, and

(3) of the obstacles which inhibit further investment in training and education.

II. METHOD

From a state-wide sample of farm boys, hypotheses regarding a theory of choice will be tested to determine variables influencing educational and occupational plans.

III. RESULTS

Data obtained from a state-wide sample of 860 Iowa farm boys graduating from non-metropolitan high schools indicate wide variation in the values attached to the non-income attributes of farming and nonfarm occupations. More specifically, approximately 8 percent of the group stated that they would be willing to sacrifice $2,500 or more of annual income for the opportunity of enjoying the non-income attributes they associated with farming. On the other hand, nearly the same percentage indicated a willingness to sacrifice $2,500 or more of annual income for the opportunity of enjoying the non-income attributes they associated with nonfarm occupations. About 9 percent said they were indifferent between the non-income attributes they associated with farming and those they associated with nonfarm occupations.

IV. DISCUSSION

Data for this project were collected in a series of statewide surveys covering a sample of farm boys who graduated from Iowa non-metropolitan high schools. These data have been coded and punched on IBM cards for analysis. The data collection phase of the work was financed by state funds. Work which was extended and completed with funds available under O. E. 5-85-108 is discussed in conclusions and implications.

V. CONCLUSIONS AND IMPLICATIONS

In an effort to identify factors which were associated with this variability in non-income occupational values, a number of characteristics of the three groups were compared with the following results:

1) Variation in preferences for the non-income attributes of farming appeared to be independent of the level of education of both fathers and mothers.

2) Boys who placed a relatively high value on the non-income attributes of farming were more likely to be planning to go to work upon high school graduation than to get additional education. Boys who placed a relatively high value on the non-income attributes of nonfarm occupations were more likely to be planning additional education.

3) Boys who placed a relatively high value on the non-income attributes of farming had fathers and mothers who were more likely to want their son to go to work than to take additional training after high school graduation.

4) Variation in the boys' preferences for the non-income attributes of farming appeared to be related to 4-H and FFA experiences.

5) Over three-fourths of the fathers of boys who were willing to sacrifice $2,500 or more to enjoy the non-income attributes of farming wanted their son to be a farmer, whereas only 12 percent of the fathers of boys who were willing to sacrifice $2,500 or more to enjoy the non-income attributes of nonfarm occupations wanted their son to be a farmer. Similar differences were found among mothers.

6) The farm-nonfarm non-income valuations of the boys seemed to be related to high school academic achievement and to I.Q. Boys who were willing to sacrifice $2,500 or more to farm had a mean grade point of 1.8 and a mean I.Q. of 100.8. Boys who were indifferent between the non-income attributes of farming and nonfarm occupations had a mean grade point of 1.9 and a mean I.Q. of 103.3. Boys who were willing to sacrifice $2,500 or more to have a nonfarm job had a mean grade point of 2.4 and a mean I.Q. of 106.9.

7) The boys' valuations seemed to be independent of size of school attended as well as the farm-nonfarm composition of the senior class.

8) Boys who placed a relatively high value on the income attributes of farming had spent more time at farm work during the school year and summer than boys who placed a relatively high value on the non-income attributes of nonfarm occupations.

9) Boys who were willing to sacrifice substantial income ($2,500 or more per year) to farm were more likely to have formulated their occupational plans before the 10th grade than those who were willing to sacrifice substantial income to have a nonfarm job.

10) Occupational plans of boys who placed a relatively high value on the non-income attributes of farming were more likely to be influenced by work at school and parents than the occupational plans of boys who placed a relatively high value on the non-income attributes of nonfarm occupations. The occupational plans of the latter group were more likely to be influenced by study at school, reading in books and magazines and vocational guidance counselors than those of the farmer group.

11) Boys who had strong preferences for the non-income attributes of farming also tended to prefer more frequently work out-of-doors, work in or near present location, country living, less contact with people, work in small organizations, physical work and work with machines than boys who had strong preferences for the non-income attributes of nonfarm occupations.

VI. SUMMARY

This project increases the stock of knowledge regarding:

(1) determinants of the educational and occupational choices of farm boys, and

(2) factors that restrain post-high school investment in education.

This is accomplished by analysis of data collected in three periodic surveys of Iowa high school graduates.

VII. REFERENCES

1) Kaldor, Donald R., Eldridge, Eber, Burchinal, Lee G., Arthur, I.W., Occupational Plans of Iowa Farm Boys, Research Bulletin 508, Agricultural and Home Economics Experiment Station, Iowa State University, September 1962, 40 pages.

OE 6000 (REV. 9-66)

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ABSTRACT

Technology and economics reduce farming opportunities. Farm boys must enter nonfarm jobs; therefore, nonfarm occupational skills must be offered and the youth induced to learn the skills.

Farm life may have a high non-economic value, as shown in sampling Iowa farm boys. Approximately 8 percent of the group stated that they would be willing to sacrifice $2,500 or more of annual income for the opportunity of enjoying the non-income attributes they associated with farming. On the other hand, nearly the same percentage indicated a willingness to sacrifice $2,500 or more of annual income for the opportunity of enjoying the non-income attributes they associated with nonfarm occupations. About 9 percent said they were indifferent between the non-income attributes they associated with farming and those they associated with nonfarm occupations.

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INTERRELATIONSHIP OF HOME ENVIRONMENT AND EMPLOYMENT

Project No. 4
Contract No. O. E. 5-85-108

Marguerite Scruggs
Joanne Pearson
Carolyn Kundel

June 30 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Iowa State University of Science and Technology

Ames, Iowa
50010

TABLE OF CONTENTS

Page

I. INTRODUCTION D-1
  A. The Problem and Background D-1
  B. Review of Related Literature D-3
    1. Meaning of work D-3
    2. Relationships between employment and other aspects of life D-4
    3. Mediating functions of the family D-7
    4. Characteristice of blue-collar families D-8
  C. Objectives D-8

II. METHOD D-8
  A. Sample D-9
    1. Selection of manufacturing companies D-9
    2. Identification of sample of employees D-9
  B. Selection of Employment Variables D-10
  C. Selection of Home-Environment Variables D-10
  D. Development of Data Gathering Instruments D-11
  E. Training of Interviewers D-12
  F. Collecting the Data D-12
    1. Obtaining data from the companies D-12
    2. Contacting the eligible employees D-12
    3. Conducting the interviews D-13
  G. Analyzing the Data D-13

III. RESULTS D-14
  A. Pilot Study D-14
  B. Survey D-16
    1. Sample of companies D-16
    2. Family descriptions D-17
    3. Employment variables D-19
    4. Home environment and employment D-21

IV. DISCUSSION D-23

  A. Pilot Study D-23
  B. Survey D-25
    1. Sample of companies D-25
    2. Family descriptions D-25
    3. Employment variables D-26
    4. Home environment and employment D-27

V. CONCLUSIONS AND RECOMMENDATIONS D-28

Page
VI. SUMMARY D-29
A. Problem D-29
B. Objectives D-29
C. Method D-29
D. Results D-31
E. Conclusions and Recommendations D-32

VII. REFERENCES D-33

TABLES

Page

1. Distribution of opinions of homemakers regarding son's having same job as husband D-14

2. Distribution of home ownership by annual wages D-15

3. Distribution of responses on who makes decisions regarding family expenditures D-15

4. Distribution of families on who buys food for family D-15

5. Distribution of ratings of dietary intakes for husbands and wives in pilot study D-16

6. Number of husbands and wives in pilot study whose dietary intakes were low in each food category D-16

7. Ranges for family characteristics D-17

8. Distribution of educational levels of husbands and wives by advancement in job level D-18

9. Distribution of employees' years of apprenticeship and vocational-technical education D-18

10. Ranges for selected employment variables D-19

11. Distribution of differences in initial and 1968 job levels by initial job level D-20

12. Distribution of 1967 annual wages by categories of advancement in job level D-20

13. Distribution of scores on husband's attitude toward his job by advancement in job level D-21

14. Distribution of total absences for 1967 by job levels D-21

15. Distribution of responses to goal of providing a good education for my children D-22

16. Distribution of responses to goal of having husband advance in position or rank on his job with the company D-22

17. Distribution of social participation indexes D-23

FIGURES

Page

1. Model for investigation of interrelationship of home environment and employment D-2

2. Plan for utilization of research results D-3

I. INTRODUCTION

A. The Problem and Background

Vocational-technical education, with responsibility for preparation of men and women for meeting the changing demands of the world of work, faces many questions regarding the most effective means of fulfilling its functions. Some of these questions deal with the place of general education goals in programs of vocational and technical education. More specifically this research assumes the importance of questions regarding the role of education that contributes to improvement in home environment and the vocation of homemaking in vocational education.

Venn (30, p.1) stated that:

> . . . technology has created a new relationship between man, his education, and his work, in which education is placed squarely between man and his work. Although this relationship has traditionally held for some men and some work . . . modern technology has advanced to the point where the relationship may now be said to exist for all men and for all work.

This research is based upon the belief that not only education but also the home environment comes between man and his work. The belief that there is a positive relationship between characteristics of the home environment and achievements of the man in the work world has been supported by labor, industry, business, and education; however, research to support the validity of such relationships is limited.

Increased knowledge of relationships between characteristics of the home and family of the working man and his performance in employment is needed by vocational education as well as by employers. Such information could be utilized in providing for more effective development and utilization of human resources at various stages of education and employment.

An analysis of such relationships is needed in attempting to define the clientele to be served by vocational education. For example, should the clientele include only prospective or current employees or, in some instances, do the spouses or other family members need to be included in the educational program in order to improve the probability of success of the student in both the educational program and on the job? The scope of the educational program could be affected in terms of whether the objectives are focused exclusively on the competences needed for the specific area of employment or include other aspects of living shown to be related to performance in employment. Findings could also have implications for reaching and retaining students in training programs. Ultimately the results of research in this area could also have implications for employers in regard to selecting personnel, predicting the level of performance of employees, and providing services and educational programs to employees and their families.

Obviously no one research project can attack such a comprehensive problem area except in a limited manner. The limitations for the current investigation were set up within the framework of an exploratory model for analyzing vocational-technical education developed by the strategic intelligence unit of this research and development project.

The setting for this model is the society in which we live. Three of the components of this society are human resources, societal goals and needs, and social systems and institutions. In addition to the three major components, there are sets of variables intervening among the other components. An external set of variables associated with other aspects of the society interacts with all other parts of the model.

This study of interrelationship of home environment and employment pulls out three components of this larger model for special emphasis. These are as shown in Figure 1, human resources, social systems and institutions, and intervening or mediating variables between the first two components.

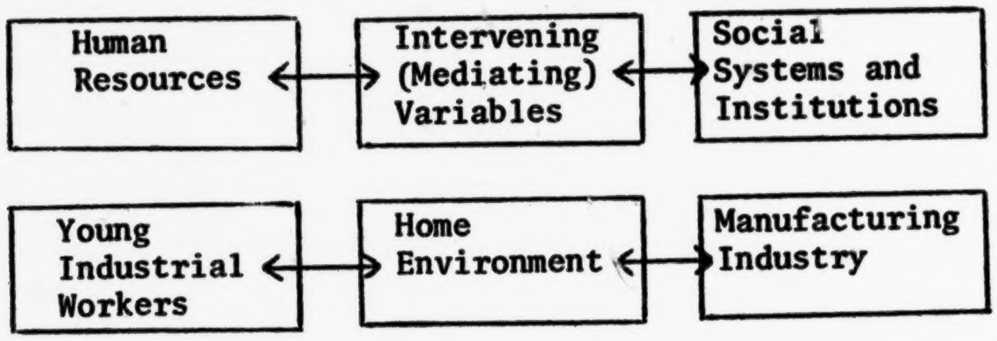

Figure 1. Model for investigation of interrelationship of home environment and employment

The human resources on which the research focuses are those associated with young industrial workers. The social institution is limited to the manufacturing industry. Intervening variables between the workers and the industry of concern in this research are those that comprise the home environment of the workers.

Modifying or differentiating variables in regard to the young industrial workers included in this study are those that set limitations on the human resources in such a way as to affect the individual's ability to function as an industrial employee or to cope with variables intervening between him and his employment in industry. Some of the modifying variables include attitudes toward the job, educational attainment, marital status, employment status, and location of residence.

The present research is limited to an examination of the characteristics of young industrial workers and their families in relation to the functioning of the workers within the manufacturing industry. Differentiating variables in industry that contribute to the complexity of the research problem include size of the industry, type of product manufactured, patterns of job classifications and promotions, and labor-management relationships as well as systems of record keeping.

The plan for utilization of research results is illustrated in Figure 2. Findings that have implications for vocational education will be made available through a number of well-established channels at the national, state, area, and local levels. Plans include reporting results directly to vocational educators and utilizing results in the development of curriculum materials for programs designed for present and potential workers as well as family members.

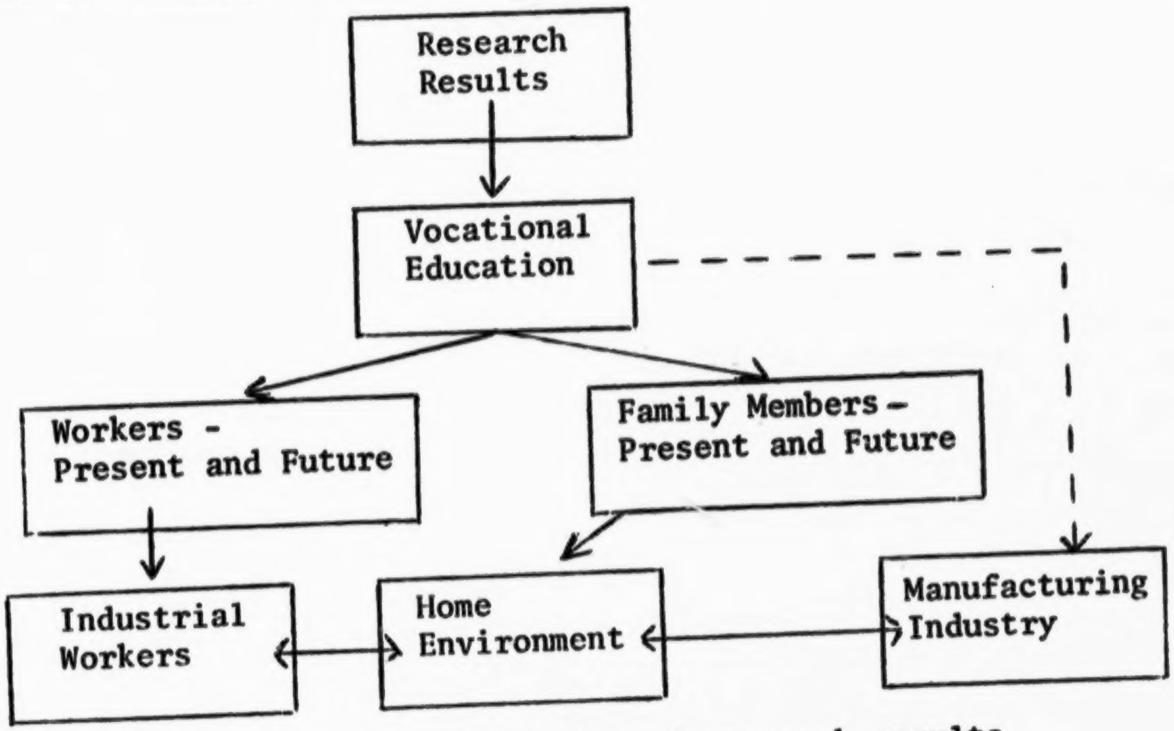

Figure 2. Plan for utilization of research results

B. Review of Related Literature

1. Meaning of work. Although the meaning of work varies among individuals and social groups and continues to undergo change, in our society work plays a dominant role in shaping and identifying the life style of man. Menninger described the meaning of work in western society as follows:

> In our society, work determines the way of life, particularly as it applies to the head of a household. There are the obvious, conscious, psychological reasons for work--the necessity for self-preservation, the desire to raise a family and to be able to support that family, the satisfaction of pleasant relationships with associates on a job. (18, p. xiii)

In discussing different connotations of work associated with different ways of viewing workers, Levy stated:

> There is a tendency to regard people who produce real objects more as real workers than those who sell the objects--and non-workers are those who consume the objects. Similarly, productive work is assumed more likely to be going on when it is physical and moving, closer to the use of muscles and manual handling; whereas people who talk and think for a living are less likely to be members of what is therefore so meaningfully called the working class. (14, p. 5)

Levy contrasted the role of work in the life of managers and professionals with its role in the lives of blue collar workers. For men in the former group, ". . . work is often the central pole around which they organize their desires and ambitions, out of which they build their life style." (14, p. 6) Their work is described as "absorbing" and "unfinished" (14, p. 6). Blue-collar men tend to have a more direct and observable feedback from their work accomplishments of the day and, according to Levy:

> . . . they do not take their work home with them, they are sooner reconciled to the limitations of their vocational opportunities, and thus turn more readily away from the job when it is finished for the day. (14, p. 11)

2. Relationships between employment and other aspects of life. Cox in contrast to Levy, did not differentiate among occupational groups when he stated that most modern urban ". . . people want to keep their work lives and their family lives relatively distinct." (3, p. 171) When he stated, "The defamilialization of work which arises from the separation of work from residence provides needed insulation . . . ." (3, p. 170), his examples of familialized work were the family farm and the small family business. Apparently he was discussing work in which a number of the family members are actively involved in a common producing or earning function although he referred to ". . . psychic separation between work place and home." (3, p.169)

The relationships between home environment and employment on which this study focused did not refer to any direct involvement of members of the employee's family with the performance of the job or with the employer. The home, as an environment for the man was assumed to have an effect upon the man's continuing psychological, sociological, and physical development. Such development was assumed to be related to the man's behavior on the job and thus, to his effectiveness as an employee.

From the standpoint of mental health Menninger stated:

> The psychiatrist rarely sees a patient in whom, if there are pronounced symptoms of poor mental health, there are not also concomitant disturbances in his work life. In fact, he sees many individuals whose difficulties in working are due not to incapacity to carry on a technical job but to inability to get along with other people. It is a commonly cited statistic that 60 to 80 per cent of all dismissals in any kind of work involving group activity--as in a store or an industrial concern or a factory--are due to social and emotional incapacity, not technical incompetence. (18, p. xiv)

Ghiselli and Brown (6, p. 424) cited several studies by others that gave support to the belief that feelings developed in the worker's home life would affect behaviors on the job.

Miller and Riessman, who interpreted findings of researchers regarding the stable working class, stated:

> The nature of the conditions of working-class lives (jobs, opportunities, family structure) affects behavior more than has been frequently realized; similarly, modes of understanding the environment can be more important than deep-seated personality factors in behavioral patterns. (For example, workers' low estimates of opportunities and high expectations of risk and loss play a more crucial part in their unwillingness to undertake certain long-term actions than do personality inadequacies involved in a presumed inability to defer gratification.) (19, p. 25-26)

External threats tothe stability of the worker include unemployment, layoffs, plant relocations and strikes. Internal threats to stability, according to Miller and Reissman, are ". . . family discord, including divorce and desertion, intergenerational conflict, and the desire for excitement." (19, p.30)

Sexton contrasted the middle-class wife and the workingman's wife, whom he described as ". . . largely alien to her husband's life and interests." (26, p. 83)

> While the middle-class wife generally has intimate knowledge of her husband's job and working life, conceiving her main job to be that of hostess to his friends and business associates, the workingman's wife sometimes knows nothing about her husband's work--what he does or even where his job is located--and rarely thinks of herself as a means of advancing her husband's career through excellence as a hostess and 'contact-maker.' (26, p. 83)

In discussing the reactions of the family of the blue-collar worker to his job, Dyer reported:

> Job conditions do create problems in the home for blue-collar families . . . but the data from my research and from other similar studies indicate that most blue-collar families have a high level of acceptance of the occupational setting of the family, and job satisfaction is positive, although not as high as for white-collar families.
>
> Some men choose to deny any connection between their work and their family life, but research data indicate that their families display a keen perception of the work situation as it affects the father and the family, and, in fact, that there is a high correlation between the feelings of husband, wife, and children about the job. (4, p. 86)
>
> Although the job situation may be the spawning place of job dissatisfaction, the family may well be the incubation spot that nurses the grievances that result in job termination, transfer, absenteeism, work slow-down, and low morale. More research is needed to determine what factors are actually involved in a worker's decision to change jobs, to stay home, to get a transfer, or to work at minimum capacity. (4, p. 87)

Kutash and Strong discussed ways in which emotional distress of employees affects job performance. They stated that:

> The problem may appear as failure to meet standards; frequent absence; failure to cooperate with others; recklessness or on the other hand, unwillingness to take legitimate risks; temper tantrums; helplessness and dependency; inability to delegate; unwillingness to accept legitimate authority . . . . (13, p. 6)
>
> When an emoloyee suffers a change for the worse in his family situation, he may reflect this change in his on-the-job behavior. (13, p. 8)

Among other characteristics of two groups of workers with chronic absenteeism, Pierloot, Gebrisen, and Reynders reported negative attitudes toward work, repeated disabilities associated with a variety of symptoms, and more asocial forms of family life. (22)

Additional research concerning relationships between employment and other aspects of life was reviewed by Souder (27).

3. Mediating functions of the family. The mediating function of the family is described by Vincent as the function:

> . . . whereby the changing requirements (demands, goals) of the society and its other social institutions are translated and incorporated into the ongoing socialization of all members of the family, both children and adults. (31, p. 24)

Vincent also pointed out the adaptive functions of the family in relation to the employment of the husband in such matters as moving to another location when the worker's job is moved, making adjustments in roles of family members when work is at a time other than the day shift. (31, p. 28)

The family can provide for the needs of individual members for emotional release and emotional balance. Vincent stated:

> The church, the school, the office, and the market place cannot possibly provide sufficient freedom for the amount of emotional release and input apparently needed by the individual . . . . And Father, who can rarely express his feelings of anger at a client, customer, or superior within the work situation, needs on occasion to ventilate such feelings within the privacy of the home and the family. (31, p. 31)

Hurvitz discussed the family's relationship to the husband's work as follows:

> . . . although the family is no longer a production unit in itself, it is still an economic unit which is organized about the husband's function as the breadwinner. . . .
>
> The family, in turn, is a unit which has as one of its primary purposes to facilitate the wage earner's effective functioning in his role as breadwinner. It is his family that helps the worker to compete in the labor market, to maintain his productivity, to resist the exploitive process, and to replenish

> and revitalize himself. It is also his family that requires him to maintain his function in the productive process when he feels he cannot compete, when he cannot maintain his productivity. . . . It is because he maintains his role as breadwinner on his own job. . . . that he creates the wherewithal upon which his family functions and from which he gains his authority and status in the family. Thus, both the blue-collar husband the the blue-collar wife give first rank to his livelihood-earning role. (10, p. 98)

4. Characteristics of blue-collar families. Handel and Rainwater concluded that working-class families could be characterized as ". . . traditional and modern " (7, p. 37) in regard to family life and social participation. These authors concluded that interest in owning the home appeared similar in the working class and middle class but actually resulted from a desire to escape from restrictions and subordination to a landlord for the working-class couple and represented proof of status for the middle-class couple. (7, p. 39)

Komarovsky found that masculine domination was more prevalent in families with incomes of less than $4000 than in those with higher incomes. (12, p. 224) Few of the men were proud of their occupational achievements (12, p. 280).

C. Objectives

Based on the results of phase I, a pilot study, the objectives of the survey, phase II, were formulated. The pilot study was reported by Scruggs and Souder (25) and Souder (27). The objectives of phase II were:

1. To determine interrelationships among selected characteristics of home environment and performance of employees in skilled, semi-skilled, or unskilled jobs.
2. To make recommendations regarding programs in vocational and technical education designed to serve such workers, their families, and business and industry in non-metropolitan areas.

II. METHOD

Throughout the report procedures used in phase I of the study will be distinguished from those used in phase II if they differed in a major way. Phase I refers to the pilot study and phase II to the survey. If the phase is not identified, the procedure was essentially the same in both phases.

A. Sample

Since this research was designed to contribute information needed for the improvement of vocational and technical education with special emphasis on non-metropolitan areas, the sample of manufacturing companies as well as the sample of employees within these companies reflected a concern for occupations for which vocational or technical education provides training and for industrial workers who lived or at one time may have lived in non-metropolitan areas. The sample was limited to the state of Iowa because of budget considerations, but it is assumed that conditions found in Iowa would not be too different from those found in similar midwestern states.

1. Selection of manufacturing companies. Companies manufacturing fabricated metal products, machinery and equipment composed the group from which the sample was selected. As explained by Scruggs and Souder (25, p. C-4) and Souder (27, p. 33), the company chosen for the pilot study was a manufacturing firm that was well-established, had maintained good labor-management relations over a period of years, and employed sufficient workers to provide for the sample size desired.

Criteria for selecting companies to participate in the survey included: (a) manufacturer of fabricated metal products, machinery and equipment as identified in the Iowa Directory of Manufacturers (11) and substantiated by faculty members in engineering extension, (b) headquarters in Iowa or an adjoining state, (c) in operation at least by 1951, (d) at least 100 employees in 1955, (e) the same number or increasing numbers of employees according to the categories in the Iowa Directory of Manufacturers (11) between 1951 and 1967, and (f) no more than one union organized as a bargaining unit. The Thomas Register of American Manufacturers (29) and Moody's Industrial Manual (28) were used to further substantiate the product of the companies and whether the company was Iowa-owned or a branch or subsidiary of a company established in another state.

2. Identification of sample of employees. The following criteria for selecting employees to be included in the study were the same for both phases of the research: (a) Each man was married with his wife living at home and employed outside the home no more than 20 hours per week. (b) Each family included one or more children under the age of 18 living at home. (c) Each man had completed at least an eighth grade education according to company records. (d) Each was first employed by the company at an entry level "blue-collar" job. Some exceptions were made to the last criterion.

The sample of 40 families in the pilot study included two criterion groups of 20 with one group consisting of men employed in the first three wage groups and the second group of men employed in upper wage groups at the time of the study. For more details see Scruggs and Souder (25, p. C-4-6) or Souder (27, p. 33-39). Each man was initially employed by the company during 1951 through 1955 and had been continuously employed there since that time. Each was 20 to 40 years old at the time of first employment.

In phase II each man was initially employed by the company during 1955 through 1959 and was born no earlier than 1925. Prior to choosing the years of initial employment, trends of industrial development in Iowa were examined (17, 20). In most companies the number of employees whose names and data were submitted to the researchers represented a census of those eligible. For companies having more than 50 men eligible, a random sample was selected.

B. Selection of Employment Variables

Variables included in phase I are discussed by Scruggs and Souder (25, p. C-6) and Souder (27, p. 39-43). Results of the pilot study indicated that the same variables should be included in the survey in so far as the availability of data from various companies permitted.

Employment variables included in the survey were of several types. One type was assumed to represent responses of the company to the employee's work record. These included advancement in terms of job levels, gain in wage rate, wage rate at time of study, 1967 gross income from wages received by individual from the company as reported by the employee, and level of job at time of study. A second type of employment variable included behaviors of the employee on the job that were assumed to affect the responses of the company to the employee. These included total hours absent in 1967, hours absent due to occupational injury in 1967, hours absent due to other causes in 1967, number of lost-time accidents on the job in 1967, number of successful bids upward, number of suggestions to company, and attitude toward his job. A third type of employment variable included such descriptive characteristics as number of years employed at the company, shift worked and level of initial job.

C. Selection of Home Environment Variables

Because this research was designed to serve vocational education programs and was conducted by researchers in home economics, it focused on those behaviors in the home that education can hope to change and that fall within the scope of home economics.

Variables related to the home included demographic characteristics; extent of employment of the wife outside the home; educational history of the husband and of the wife; beliefs of the husband and of the wife regarding decision making in the family, the family and its members and development of children; attitude of the wife toward food preparation; knowledge of food fallacies on the part of the wife; food practices of the husband and wife; clothing practices of the family; social participation on the part of family members; roles of husband and wife in money management; family income; health of husband and wife.

D. Development of Data Gathering Instruments

The interview schedule and questionnaire used in the pilot study involved an interview of the wife approximately two hours in length and a questionnaire left for the husband. The latter questionnaire included only a record of food intake for three days and a report of family income. For more details see Scruggs and Souder (25, p. C-7) and Souder (27, p. 45-49).

The data gathering instruments for phase II included a form, Initial Family Contact, utilized in making an appointment for interviewing the husband and wife and determining the eligibility of the family to be included in the study; Interview of Wife; Interview of Husband; and three forms used with companies including the Employee Data Sheet filled in for each employee by the company. The six forms were submitted to the U.S. Office of Education for approval on February 17, 1968. The notification of clearance for use of the instruments, after some minor revision, was dated February 26, 1968. Prior to submitting the instruments for approval, practice interviews were conducted by the researchers.

The choice of items included in the interview schedule was based upon analysis of data obtained in the pilot study, consultation with experts in child development, food and nutrition, home management, textiles and clothing, home economics education, psychology, sociology, and economics. Family profiles of data and case studies were analyzed and discussed by experts in the various fields.

Consultants agreed on the desirability of interviewing both the husband and the wife. Consultants in the Statistical Laboratory, Iowa State University, as well as the experience of the researchers in the pilot study indicated that an individual interview should be a maximum of one hour in length. This time limitation necessitated eliminating a number of kinds of data from the final interview schedule.

A number of the items were obtained or adapted from earlier studies including questions related to clothing practices from Winakor (32) and from Souder (27), money making decisions in the family from Babcock (2), beliefs about families from Petrick (21), family goals from Poulson (23), beliefs about child development from Roland (24), attitude of the husband toward his job from Lewis and MacKinney (15), attitude of the wife toward food preparation from Aspegren (1), and food practices from Hinton (8). Questions regarding housing status were developed in consultation with an expert in home management. The items dealing with food fallacies were from Hinton (9).

E. Training of Interviewers

The two interviewers in the pilot study were two professional home economists serving as a research associate and graduate assistant on the project. The training was described by Scruggs and Souder (25, p. C-7) and Souder (27, p. 49-51).

In phase II of the study representatives of the Statistical Laboratory, Iowa State University, selected two interviewers in each of the geographical areas in which data were collected. In a series of one-day training sessions held in Ames, the interviewers were trained by the principal investigator, a supervisor from the Statistical Laboratory, and the graduate assistant on the research project. The supervisor followed up the one-day training period by accompanying the interviewers on actual interviews and through conferences. An interviewer manual was prepared prior to the training sessions and was given to each interviewer.

F. Collecting the Data

Procedures used in collecting the data in the pilot study were described by Scruggs and Souder (25, p. C-8) and Souder (27, p. 51-57). Data were obtained from the cooperating company, the employee by means of a questionnaire left at the home, and the wife of the employee by means of an interview.

Data for phase II were collected from the cooperating companies, the employee and his wife by means of interviews, and observations by the interviewers in regard to the housing.

1. Obtaining data from the companies. Following a letter to a company representative from the director of the Center for Industrial Research and Services at Iowa State University and a telephone call from the principal investigator, a professional home economist personally contacted a representative of the company to explain the research, request participation, and leave the necessary number of employee data sheets. In some instances the home economist assisted in recording the data on the data sheets.

2. Contacting the eligible employees. In the pilot study a letter signed by company and union officials was mailed to

the selected employees prior to the beginning of the interview. In phase II participating companies selected various methods of contacting the employees. Some companies sent a letter to the employees similar to the letter used in the pilot study. In most instances the companies asked the principal investigator to write a letter to the employees. Some companies contacted each employee individually in person prior to providing the names and data to the researchers.

3. Conducting the interviews. The interviews were conducted during the spring and early summer of 1968. Interviewers visited each home, made an appointment to interview the husband and wife at the same time, and returned to the home at the appointed time. A pair of interviewers conducted the two interviews in separate rooms of the home whenever possible so that the responses of one interviewee would not affect the responses of the other. A high proportion of the interviews were conducted in the evening.

Each of the pair of interviewers independently made judgments regarding housing characteristics after leaving the home.

The completed forms were mailed to the supervisor, Statistical Laboratory, and were checked by her for completeness. If data were missing, she contacted the interviewers and requested that they obtain the needed data.

G. Analyzing the Data

Methods of analysis of data in the pilot study were reported by Scruggs and Souder (25, p. C-9-10) and by Souder (27, p. 57-63). More complete information regarding analysis of data in phase II will be reported by Joanne Miller Pearson and Carolyn Joy Kundel in theses that were in progress at the time that this report was written.

This report was based on data from 37 families employed by five companies in three of the geographical areas included in the study. Data were recorded on flow sheets according to a coding plan, cards were punched, and selected cross runs were made. Other findings were based on an inspection of data recorded on the flow sheets.

Further analyses included in the theses are based upon analyses within companies as well as across companies. Intercorrelations between items on several of the tests are examined prior to obtaining total scores. Relevant correlation matrixes are examined. Dietary intakes were scored according to a method used by Hinton (8).

III. RESULTS

The results are reported separately for the two phases of the study. Results of the pilot study that were reported by Scruggs and Souder (25) and Souder (27) are not repeated in this report. Additional findings from the pilot study are reported in a thesis in progress by Carolyn Joy Kundel. The results of the survey included in this report are based upon data from 37 couples from three Iowa communities. Findings from the complete survey are reported in theses in progress by Joanne Miller Pearson and Carolyn Joy Kundel.

A. Pilot Study

The workers in the two criterion groups had worked for the same company for 10 to 16 years. There was almost as much variance within the two groups as within the total group on such characteristics as income from wages, absences from work, and housing status.

One of the measures omitted from the survey because of the necessity of reducing the length of the interview was the attitude of the wife toward the job of the husband. Responses to the question, "Would you like for your son to have the same job that your husband has now when he grows up?" are reported in Table 1.

Table 1. Distribution of opinions of homemakers regarding son's having same job as husband

Response	Criterion Group[a] 1	2
Yes	0	4
No	15	7
Other		
OK, if he's happy.	3	9
Wouldn't hurt him.	2	0

[a] Code: 1=Husband's job at time of study was in a lower wage group.
2=Husband's job at time of study was in an upper wage group.

Three-fourths of the wives whose husbands were in lower wage groups replied, "No".

The number of families in the pilot study reporting ownership and renting of their home is shown in Table 2. Seven-eighths of the families owned their own home.

Thirteen of the 20 families in Group 1 and eleven of the 20 families in Group 2 had done major remodeling of their houses. One family in each group had built a new house.

Table 2. Distribution of home ownership by annual wages

Annual wages	Own	Rent	Total
4,000 - 5,499	3	0	3
5,500 - 6,999	12	3	15
7,000 - 8,499	19	2	21
8,500 - 9,999	1	0	1
Total	35	5	40

When asked who made decisions regarding family expenditures, the homemaker responded as shown in Table 3. Food for the family was reported as being purchased by the family members as shown in Table 4. In 67.5 per cent of the homes the homemaker alone was the one who did the buying of the food. The next most frequent practice was the husband and wife doing the shopping together. In none of the homes did the homemaker indicate that the children did some of the food shopping.

Table 3. Distribution of responses on who makes decisions regarding family expenditures

Family member or other response	Criterion Group 1	2	Total
Husband	8	4	12
Both husband and wife	9	11	20
Wife	3	4	7
Other - Bills due	0	1	1

Table 4. Distribution of families on who buys food for family

Family member	Total
Homemaker all	27
Homemaker some	1
Husband and wife together	7
Husband some	2
Husband all	3
Total	40

Table 5 shows the distribution of ratings of dietary intakes for husbands and wives. These ratings were based upon a 24-hour recall of food intake for the woman and a three-day food record

Table 5. Distribution of ratings of dietary intakes for husbands and wives in pilot study

Rating[a]	Number husbands	Number wives
Poor	2	26
Fair	9	9
Good	17	5
Excellent	12	0

[a]Bases for the ratings were:

Poor=60-70 points with less than ½ of allowable points for milk, high vitamin C foods, and dark green and yellow vegetables or score of less than 60 points.

Fair=70-84 points with less than ½ of allowable points as listed above or 60-70 points with at least ½ allowable points as above.

Good=70-84 points with at least ½ of allowable points as above.

Excellent=85-100 points including at least 3/4 of the allowable points for milk, high vitamin C foods,and dark green and yellow vegetables.

for the husband. Ratings of fair or poor were received by 87.5 per cent of the women and only 27.5 per cent of the men. The food groups in which diets were low are shown in Table 6. The number of wives whose diets were low in each food group ranged from almost half to almost all. Diets of over half of the men were low in three of the six food groups.

Table 6. Number of husbands and wives in pilot study whose dietary intakes were low in each food category

Food category	Number of husbands	Number of wives
Dark green and yellow vegetables	37	39
High vitamin C	26	32
Other fruits and vegetables	9	22
Whole grain and enriched cereal	2	26
Milk	23	28
Meat	4	19

B. Survey

1. Sample of companies. The participating companies included approximately fifteen midwestern manufacturing firms ranging in

size from 101 to over 1000 employees. Five additional companies were willing to participate, but they had no employees or only one employee who met the criteria for being included. A total of 28 companies were contacted in person and six additional companies were contacted by letter, but arrangements were not completed for their participation. Data were provided by the companies for approximately 200 men who met the criteria to be included.

Of the first 60 families contacted interviews were completed for 37 couples (seventy-four individuals), two refused to participate, 18 were ineligible because the wife was working, and three were ineligible because there were no children at home.

2. Family descriptions. The ranges of responses for some of the characteristics of the families are shown in Table 7.

Table 7. Ranges for family characteristics

Characteristic	Low	High
Age of husband	27 years	41 years
Age of wife	21 years	46 years
Number of children	1	6
Educational level of husband[a]	6 years	16.1 years
Educational level of wife[a]	8 years	16 years
Wife - extent urbanized[b]	1.3	6.0
Husband - extent urbanized[b]	1.4	6.0
Number of years married	4 years	18 years
Wife's score on educational background[c]	0	6
Husband's score on educational background[c]	0	5

[a] Includes sum of all types of education. One man reported only six years of education although company records showed eight.

[b] Average size of community lived in during lifetime:

1. On a farm
2. In a town under 2500
3. In a city 2500 - 10,000
4. In a city 10,000 - 25,000
5. In a city 25,000 - 50,000
6. In a city over 50,000

[c] Score based on parental education and own educational history. Possible range was 0 - 7.

Other information about the families included the following: Five of the 37 wives were employed but not more than 20 hours per week. Two of the wives and three of the husbands reported previous marriages. Two families had one other person living with the parents and children. Thirty of the residences were in a non-metropolitan area and seven were in a standard metropolitan statistical area. Homes of 26 of the families were within the city limits of the city in which the company was located. None lived as far as 20 miles from the company.

The distribution of educational levels of the husbands and wives according to advancement in job level by the husband is shown in Table 8. Table 9 shows the distribution of employees' years of apprenticeship and vocational-technical education.

Table 8. Distribution of educational levels of husbands and wives by advancement in job level

Years of education	Respondents	Difference in initial and 1968 job level 0	1	2	3	4	5	6	Total number
8[a]	Husbands	1	0	1	0	1	0	0	3
	Wives	2	0	0	0	0	0	0	2
9-11	Husbands	0	0	1	2	1	1	0	5
	Wives	1	0	2	2	2	0	0	7
12	Husbands	2	1	5	5	2	1	1	17
	Wives	1	3	5	7	4	4	1	25
13-14	Husbands	1	2	2	0	2	0	0	7
	Wives	0	0	1	0	1	0	0	2
15-16	Husbands	0	0	0	2	1	2	0	5
	Wives	0	0	1	0	0	0	0	1

[a] One man reported only six years of school. Company records listed eight years.

Table 9. Distribution of employees' years of apprenticeship and vocational-technical education

Quantity of training	Apprenticeship	Vocational-technical education
None	33	26
Less than 6 months	0	3
6 months to less than 1 year	2	2
1 year to less than 1½ years	0	2
2 years to less than 2½ years	0	1
3 years to less than 3½ years	0	3
4 years or more	2	0

In judging their own health in comparison with other men their own age, two men reported their health as worse than most, 25 as about the same as most, and 10 as better than most. In judging frequency of illnesses including colds 17 men said that they were ill seldom or never, 17 said sometimes, and three responded frequently.

The annual family incomes for 1967 exclusive of wages received from the company by the husband ranged from none to almost $4000. None or less than $100 was reported by 22 families.

3. Employment variables. The ranges for selected employment variables are shown in Table 10. The distribution of years of employment by the compnny was 14 men for nine years; six or seven men for each of 10, 11, and 13 years; and three men for 12 years.

Table 10. Ranges for selected employment variables

Characteristic	Low	High
Number years employed by the company	9 years	13 years
Age of husband when first employed by the company	18 years	30 years
Rate of pay of initial job[a]	$1.70	$3.46
Rate of pay of 1968 job	$2.69	$4.61
Difference in wage rates for initial and 1968 job	None	$1.79
Level of original job[b]	1	6
Level of 1968 job[b]	2	7
Absences - total for 1967	0 hours	276 hours
Absences due to occupational injury in 1967	0 hours	112 hours
Absences in 1967 not due to occupational injury	0 hours	276 hours
Number of lost-time accidents	0	1

[a] Based on 1968 wage rate for same or comparable job.
[b] Code for job levels is shown on Table 11.

The distribution of advancements in job level is shown in Table 11. Any reference to job levels in this report refers to the coded levels explained in the footnote of Table 11.

The annual wages for 1967 were reported by the men. The distribution of these wages is shown in Table 12.

The distribution of scores of the husbands on a measure of attitude toward the job is shown in Table 13 according to advancement in job level. Thirty-two of the 37 men had attitude scores ranging from 20 to 39.

Table 11. Distribution of differences in initial and 1968 job levels by initial job level

Initial job level[a]	Number of levels between initial and 1968 job							Total number of men
	0	1	2	3	4	5	6	
1	0	1	7	6	5	2	1	22
2	1	0	1	0	1	1	0	4
3	2	0	0	3	1	0	0	6
4	1	1	0	0	0	1	0	3
5	0	0	1	0	0	0	0	1
6	0	1	0	0	0	0	0	1
Total number of men	4	3	9	9	7	4	1	37

[a] Code: 1=Beginning unskilled
2=Upper level unskilled
3=Lower level semi-skilled
4=Upper level semi-skilled
5=Lower level skilled
6=Upper level skilled
7=Foreman
8=Middle management
9=Upper management

Table 12. Distribution of 1967 annual wages by categories of advancement in job level

Income	Number of levels between initial and 1968 job							Total number of men
	0	1	2	3	4	5	6	
\$5000-\$5999	0	0	0	2	2	0	0	4
\$6000-\$6999	3	0	1	2	3	0	0	9
\$7000-\$7999	0	1	2	3	0	1	0	7
\$8000-\$8999	1	1	5	2	2	2	1	14
\$9000-\$9999	0	0	0	0	0	0	0	0
\$10,000 or over	0	1	1	0	0	1	0	3

Table 14 shows the distribution of total absences for 1967 according to the 1968 job levels of the employees. The vertical and horizontal totals on the table show the total number of men in the various categories of absences and in the different job levels for 1968 respectively.

Table 13. Distribution of scores on husband's attitude toward his job by advancement in job level

Score[a]	Difference between initial and 1968 job level							Total
	0	1	2	3	4	5	6	
10	0	0	0	1	0	0	0	1
20-29	2	0	4	3	4	2	1	16
30-39	2	3	3	4	2	2	0	16
40-46	0	0	2	1	1	0	0	4

[a]Highest possible score was 48.

Table 14. Distribution of total absences for 1967 by job levels

1968 job level	Category of absences[a]								Total men
	0	1	2	3	4	5	6	7	
2	1	0	1	0	0	0	0	0	2
3	1	3	1	0	2	0	1	1	9
4	1	2	1	2	0	1	0	1	8
5	1	1	1	2	0	1	0	0	6
6	1	1	1	0	2	1	0	0	6
7	0	1	0	2	0	2	0	0	5
9	0	1	0	0	0	0	0	0	1
Total men	5	9	5	6	4	5	1	2	37

[a]Code for absences:
0=no hours absent
1=1-8 hours absent
2=9-16 hours absent
3=17-24 hours absent
4=25-40 hours absent
5=41-80 hours absent
6=80-120 hours absent
7=121 or more hours absent

4. Home environment and employment. Results related to some of the home environment variables that appear to be associated with employment characteristics are reported here. Husbands and wives were asked to indicate the importance of a number of goals to their family. The distribution of responses to the goal of providing a good education for my children is shown in Table 15. Table 16 shows the distribution of responses to the goal of having the husband advance in position or rank on his job with the company. Each of these distributions is presented in relation to the husband's advancement in job levels.

Table 15. Distribution of responses to goal of providing a good education for my children

Advancement in job levels[a]	Respondents	Number responding Not important	Important	Very important
0	Husbands	0	0	4
	Wives	0	1	3
1-3	Husbands	0	4	17
	Wives	0	4	17
4-6	Husbands	0	4	8
	Wives	0	0	12
Total responses		0	13	61

[a]Number of job levels between initial and 1968 job level of husband

Table 16. Distribution of responses to goal of having husband advance in position or rank on his job with the company

Advancement in job levels[a]	Respondents	Number responding Not important	Important	Very Important
0	Husbands	0	3	1
	Wives	2	2	0
1-2	Husbands	2	9	1
	Wives	2	9	1
3-4	Husbands	0	11	5
	Wives	4	9	3
5-6	Husbands	1	4	0
	Wives	1	4	0
Total responses		12	51	11

[a]Number of job levels between initial and 1968 job level of husband

The distribution of social participation indexes for the wives, husbands, and combined scores for each couple is shown in Table 17. An examination of the social participation indexes according to the husband's advancement in job level revealed no patterning of relationships between the two variables.

The structural condition of the house was rated as poor for only one of the homes. A rating of good was received by 26 homes. Others were rated fair to good. No pattern of relationships between structural condition of house and advancement in job levels was discernable.

Table 17. Distribution of social participation indexes

Social participation index	No. wives	No. husbands	No. couples[a]
Less than 10	21	29	9
10-19	11	7	17
20-29	4	1	7
30-39	1	0	2
40-49	0	0	2

[a] Sum of the scores of husband and wife

An examination of the scores of the husbands and wives on knowledge of child development indicated that a positive relationship exists between the extent to which the responses agreed with those of experts in the field of child development and the extent of advancement in job levels of the husband. Out of a possible score of 19, scores for the husbands ranged from eight to 16 and for the wives from seven to 17.

On a measure of beliefs about the family there appeared to be no relationship between the scores of the wives and the advancement in job levels of the husbands; however, there appeared to be a slight positive relationship between the scores of the husbands and their advancement in job level. Out of a possible score of 144, the scores for both husbands and wives ranged from the sixties to the eighties.

The highest possible score for a measure of democratic attitudes toward making decisions about money in the family was 54. The ranges of scores for the wives and husbands were 18 to 44 and 12 to 35, respectively. The medians for the two groups were approximately 25 and 26, respectively. There appeared to be no relationship between attitude toward decision making about money and advancement in job level by the husband.

The highest possible score for knowledge in the area of food fallacies was 34. Scores for the wives ranged from eight to 25. There was no relationship between these scores and advancement in job level by the husband.

IV. DISCUSSION

A. Pilot Study

An examination of the results from the pilot study indicated that, in general, the two criterion groups were not contrasting groups. They appeared to be a stable group of workers with wide variation among individuals on a number of the characteristics. Although there were wide differences between the two groups in terms of the wage group of the present job, the annual wages reported by the husbands overlapped to a large extent. There was evidence that a variety of factors affected the man's decisions regarding his job. The possibility of incentive wage rates at certain wage group levels and in certain departments of the company, the working conditions associated with some of the jobs at wage group levels higher than those held by the men in criterion Group 1, along with the age and health of the employee could be assumed to affect the choice of job by the man.

The two criterion groups differed on the response of the wife as to whether she would like for her son to have the same job as that of her husband. Over twice as many of the wives whose husbands were in the lower wage groups as those in the upper wage groups indicated that they would not like for their sons to have the same job as their husband. Although a variety of reasons were given for the response, the types of reasons did not appear to vary between the two groups. It was concluded that the wives from criterion Group 1 had a less favorable attitude toward their husband's job than was true for wives in Group 2.

There appeared to be no difference between the two criterion groups on home ownership. Neither did amount of annual wages appear to be associated with this characteristic. Not only did most of the families own their own homes, but frequently the husbands were engaged in "do-it-yourself" housing projects. The 25 families who reported major remodeling and six families reporting home improvement in the way of maintenance proudly showed the interviewers the results of their own labor.

There appeared to be a difference between the two criterion groups in relation to who made decisions regarding family expenditures. More of the husbands in Group 1 than in Group 2 were identified as the family member making decisions regarding expenditures. One wife responded that the bills due rather than any one member of the family determined the family expenditures.

In contrast to the responses regarding decisions related to family expenditures, more of the wives than the husbands were buying the food for the family. There was no difference between the two criterion groups on this characteristic.

The two criterion groups did not appear to be different from each other on the ratings of dietary intake for the husbands and wives. One explanation for the differences in dietary intake between wives and husbands in the same family is that 30 of the families reported that the family ate together for one meal a day and five of the families reported that they almost never ate together. The husbands carried a lunch to work every day.

The finding that fruits and vegetables were lacking in so many of the diets is consistent with results of other dietary surveys of Iowans (5, 16). Eppright also found that the consumption of milk was low (5).

B. Survey

1. Sample of companies. As contacts with the companies proceeded, inability to predict the number of eligible employees from the category of size of company became obvious. Companies with 101 to 250 employees ranged from having no employees to 10 employees eligible to participate. The range for companies with 251 to 500 employees was from three to 12 eligible. Companies with 501 to 1,000 employees had from one to 36 eligible. Companies with over 1,000 employees had from around 30 to 800 eligible. Some of the reasons for non-participation by companies included involvement with negotiations on new contracts with labor, kinds of records of employees available that affected the time investment on the part of the company, and attitudes of labor toward participation in such surveys. When four of the largest companies refused to participate, obtaining the planned sample size became difficult.

An attrition of about one-third of the families because of wives working was anticipated. In one metropolitan area two-thirds of the sample was lost mainly because of wives working.

2. Family descriptions. The attempt to obtain a sample of young industrial workers who were fairly homegeneous as to age resulted in an age span of 14 years for the husbands and 15 years for the wives. The group was more heterogeneous, however, in terms of the number of years married with a range of four to 18 years.

None of the husbands had a college degree. Some had sufficient post-high school education to reach a total of slightly over 16 years, however.

One of the major focuses of this study was on people who have lived or are living in non-metropolitan areas. There was much variation among the individuals in the study regarding the extent to which they had lived in communities of varying sizes.

The educational level of the husband and wife was consistent with the general population in that more wives than husbands completed high school but more husbands than wives completed post-high school education.

A larger number of the employees had participated in some vocational-technical education than had participated in apprenticeships. Only 11 and four had participated in these types of educational programs, respectively.

It was anticipated that the employees' judgments of their health and frequency of illness would be related to number of absences. For this small sample there was no such relationship in evidence.

The major source of income for these families was wages from the company. Although five women reported that they worked 20 hours per week or less, only two of the families reported $2,000 or more as family income other than the wages of the husband. Six of the families reported $1,000 or more.

3. Employment variables. The age of husbands when first employed by the company represented the maximum age range possible with the criteria set up for selecting participants. One of the problems that affected the number of eligible employees more than was anticipated was that some of the companies employed a relatively large number of older men.

The original intent had been to include only men who started with the company at the very lowest entry level job. Discussions with company representatives indicated that this would not be feasible. It was difficult to obtain the needed number of participants using a more general definition of entry level which permitted several levels of entry. An examination of the level of the initial job in relation to advancement in job levels shows that those who entered at levels five and six may have had less opportunity for advancement than those who entered at level one.

The wide range of hours of absence was consistent with findings in the pilot study. The data on absences were available from the companies except for those who had moved into white-collar positions.

In addition to analyzing the total group for advancement in job level, in later analyses company differences in opportunity for advancement will be taken into account. Analyzing on the basis of the total group probably masked some relationships that may appear when employees within companies are studied.

The distribution of 1967 annual wages by advancement in job level reveals wide differences in wages for groups of men advancing the same number of job levels. The 1968 job level, the company, and absences would affect the annual wage. The validity of the annual wage figures is assumed since the data were obtained from the men, themselves.

Any relationship between attitudes toward the job and advancement in job levels is confounded with 1968 job level. The range in scores from 10 to 46 out of a possible 48 points represents large variability on this measure and may be associated with company. The time for interviewing did not permit obtaining the attitude of the wife toward the husband's job.

The absences reported would be reflected in the annual wages for the blue-collar workers. This would not necessarily be the case for the white-collar workers. No men in the sample had moved into middle management but one had moved into upper management. He had only eight hours of absence.

4. Home environment and employment. In responding to the goal of providing a good education for the children, more of the wives than husbands in the group who had advanced most in job levels stated that this goal was very important. All four of the husbands who had not advanced in job levels rated this goal as very important. The fact that no one rated the goal as not important may indicate that such a response would not be socially acceptable.

For the groups of husbands who had advanced one to two job levels or five to six job levels, the same number of husbands and wives responded to the various levels of importance of the goal of having the husband advance in position or rank on his job with the company. Husbands who had not advanced indicated that this goal was important or very important while their wives indicated that the goal was not important or important. Whether this is an accident with the small sample or will prove to be a trend in the larger sample remains to be seen.

Although the social participation indexes of the wives were somewhat higher than those of their husbands, the difference was not large. More of a patterning of social participation may be revealed when the data are analyzed by 1968 job levels rather than advancement in job levels and when data are examined within companies.

The fact that such a large proportion of the families were in houses of good structural condition limited the possibility in this small sample of seeing any relationship between structural condition of the house and advancement on the job. A wide range of scores on the housing status was present in the pilot study. Although the scores represent a large range in this sample, the highest score predominates.

Analysis of the results of the pilot study indicated that there probably was a relationship between knowledge of various aspects of living that affect the home and the employment characteristics of the husband. More items relating to beliefs about knowledge of areas of home economics were included in the survey than were included in the pilot study. Only after the data from the larger sample are analyzed can conclusions be reached regarding relationships between knowledge of areas of living of concern to home economics and employment records of the husbands.

The beliefs regarding the family relate to traditional and emerging patterns of family life. The scores for the husbands reflected slightly more of an emerging pattern of family life than was true for the wives. This result was not expected and will be checked with the larger sample.

The measure of attitudes toward decision making about money relates to the extent to which various members of the family are involved in such decisions. The higher the score the more democratic the point of view regarding decision making in this area. Some of the husbands had lower scores than any of the wives, and some of the wives had higher scores than any of the husbands; however, the medians for the two groups were essentially the same. The more authoritarian view of the husbands would be expected from the results of the pilot study.

The wide range of scores on knowledge related to food fallacies on the part of the wife was expected. Later reports will indicate whether any relationship exists between the knowledge of food as measured in this group of items and dietary intake of the husband and wife.

V. CONCLUSIONS AND RECOMMENDATIONS

The group of workers included in the phases of this study were stable employees of manufacturing industries. The wide variations among the families indicate that any attempt to describe all such workers and their families as one group having common characteristics would be inadequate if not inaccurate. It is recommended that vocational-technical education aimed at serving present and potential industrial workers take into account the many individual differences among the students. Even though the competences needed for a given area of work may be the same for all students, much variartion is probable in their educational needs in areas that are not directly involved with the work but that will affect their ability to succeed in the work or, prior to that, to enroll in or succeed in educational programs.

Analysis of the findings to date indicates that there are relationships between selected characteristics of the home environment and employment records of industrial workers; however, additional analyses are needed before definite conclusions can be reached. Tentatively, there appear to be relationships between selected aspects of employment and such characteristics of the home environment as educational level of the wife as well as the male employee, knowledge of the wife or husband regarding child development and perhaps other selected areas of home economics, goals of the couple for advancement of the man on the job and for education of their children, and wife's attitude toward husband's job.

Further recommendations will be made subsequent to the completion of two theses in progress at the time of this report. Hopefully these further analyses will lead to improved ability to differentiate between home environment variables in terms of their relationship to specified employment variables as well as to differentiate among individuals and conditions for which such relationships would be crucial.

VI. SUMMARY

A. Problem

Increased knowledge of relationships between characteristics of the home and family of the working man and his performance in employment is needed by vocational education as well as by employers. Few studies have explored this concept to date. Such information could be used in providing for more effective development and utilization of human resources at various stages of education and employment.

B. Objectives

Based on the results of a pilot study, phase I, the objectives of the survey, phase II, were:

1. To determine interrelationships among selected characteristics of home environment and performance of employees in skilled, or unskilled jobs.

2. To make recommendations regarding programs in vocational and technical education designed to serve such workers, their families, and business and industry in non-metropolitan areas.

C. Method

The sample was selected from Iowa companies manufacturing fabricated metal products, machinery and equipment. Criteria for selecting employees to be included in the study for both phases of the research were: (a) each man was married with his wife living at home and employed outside the home no more than 20 hours per week; (b) each family included one or more children under the age of 18 living at home; (c) each man had completed at least an eighth grade education according to company records; (d) each was first employed by the company at an entry level "blue-collar" job.

The sample of 40 families in the pilot study included two criterion groups of 20 each with one group consisting of men in the lower wage groups and the other group in the upper wage groups in one company at the time of the study.

Around 15 companies participated in phase II. Each man was initially employed by the company during 1955 through 1959 and was born no earlier than 1925. In most companies a census of eligible families was used.

Employment variables included such characteristics as advancement in terms of job levels, gain in wage rate, wage rate and job level at time of study, and 1967 gross income from wages. Other employment variables included behaviors of the employee on the job.

Variables related to the home included such characteristics as educational history of the husband and of the wife; beliefs of the husbands and of the wives regarding decision making in the family, the family and its members and development of children; attitude of the wife toward food preparation; wife's knowledge of food fallacies; food and clothing practices; social participation; roles of husband and wife in money management; and health of husband and wife.

The two interviewers in the pilot study were professional home economists. In phase II representatives of the Iowa State University Statistical Laboratory selected interviewers in each of the geographical areas. These interviewers were trained in a one-day training session at Ames.

Data in the pilot study were obtained from the cooperating company, the employee by means of a questionnaire left at the home, and the wife of the employee by means of an interview. Data for phase II were collected from the cooperating companies, the employee and his wife by means of interviews, and observations of housing by the interviewers. Items included in the interview schedules were based upon results of the pilot study and consultation with experts in relevant disciplines.

Methods of analysis used in phase I were development and analysis of case studies, comparison of means of the groups, and examination of intercorrelations among variables. Methods of analysis in phase II are reported in two theses in progress, and this report includes methods used in analyzing data from 37 families employed by five companies in three of the geographical areas included in the study. Cross runs were made and data were inspected.

D. Results

In both phases of the study there was wide variation among families in regard to many of the characteristics studied including income from wages, absence from work, housing status, and educational level. No single general statement could accurately describe these workers and their families.

There was evidence of interrelationships of some characteristics of the home environment and the employment record of the husband although results to be reported in two theses in progress will help determine the extent to which such conclusions need to be tentative.

In the pilot study wives whose husbands were in the lower wage groups had less favorable attitudes, in general, toward their son's having the same job as their husband than did the wives of employees in upper wage groups.

There was a slight tendency for husbands in the lower wage groups to assume a more authoritarian role in decision making in the family than husbands in upper wage groups. Decision making tended to be shared by husband and wife more frequently as wives increased in levels of education and husbands were in upper wage groups.

Dietary intakes of 87.5 per cent of the women and 27.5 per cent of the men in the pilot study were fair or poor.

Any relationship between educational levels of the husband and wife and the husband's advancement in job levels was obscured by the possible ceiling effect of entering jobs at a higher level. Analysis of data within companies to be reported later should clarify the picture by eliminating the confounding of company with other variables under consideration.

For the small sample for which data have been analyzed, more of the wives than husbands in the group who had advanced most in job levels stated that the goal of providing a good education for the children was very important. Husbands who had not advanced in job levels rated this goal as very important.

Husbands who had not advanced tended to place more importance upon the goal of having the husband advance in position or rank on his job with the company than did their wives.

A large proportion of the families in phase II in homes of good structural condition. There was no relationship between this characteristic of the house and advancement on the job.

Knowledge of child development on the part of the wives and husbands appeared to be related to advancement of the husband in job levels. Results were inconclusive on this small sample in regard to relationships between beliefs about other areas of home economics and advancement in job levels. There appears to be no relationship between the scores of the wives and the advancement in job levels of the husbands, but there did appear to be a slight positive relationship between the scores of the husbands and their advancement in job level. There appeared to be no relationship between attitude toward decision making about money and advancement in job level by the husband.

E. Conclusions and Recommendations.

The group of workers included in the phases of this study were stable employees of manufacturing industries. The wide variations among the couples indicate that any attempt to describe all such workers and their families as one group having common characteristics would be inadequate if not inaccurate. It is recommended that vocational-technical education aimed at serving present and potential industrial workers take into account the many individual differences among the students.

Analysis of the findings to date indicates that there are relationships between selected characteristics of the home environment and employment records of industrial workers; however, additional analyses are needed before definite conclusions can be reached. Hopefully two theses in progress will lead to improved ability to differentiate between home environment variables in terms of their relationship to specified employment variables as well as to differentiate among individuals and conditions for which such relationships would be crucial.

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ABSTRACT

The objectives were to determine interrelationships among selected characteristics of home environment and employment criteria of male blue-collar employees and to make recommendations regarding programs in vocational and technical education designed to serve such workers and their families.

The sample was selected from Iowa companies manufacturing fabricated metal products, machinery and equipment. The pilot study included 40 employees and their wives from one company; the survey, employees and their wives from 15 companies. Data were collected from the company, homemaker, and husband (employee).

Employment variables included job level, mobility across job levels, wages, absences, and attitude toward job. Home environment variables included behaviors related to housing, clothing, social characteristics, child development and family relationships, food and nutrition, management of resources and health.

Findings indicated that there are relationships between selected home environment characteristics and employment records of industrial workers. It is recommended that vocational education take into account wide variations in homes of students.

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MANPOWER REQUIREMENTS AND DEMAND IN AGRICULTURE BY REGIONS AND NATIONALLY, WITH ESTIMATION OF VOCATIONAL TRAINING AND EDUCATIONAL NEEDS AND PRODUCTIVITY

Project No. 5
Contract No. O. E. 5-85-108

Earl O. Heady
Peter L. Arcus
Gerald E. Schluter

June 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Iowa State University of Science and Technology

Ames, Iowa
50010

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	E-1
II.	METHODS	E-2
III.	RESULTS	E-3
IV.	DISCUSSION	E-44
V.	CONCLUSIONS	E-47
VI.	SUMMARY	E-48
VII.	REFERENCES	E-50

I. INTRODUCTION

This project deals with estimation of labor and manpower requirements in agriculture and the related agribusiness sector for the nation and for as many as 144 regions of the country. It deals with estimation of the types of skills and work abilities that will be required by each. Finally, it deals with the types and amounts of education needed and the return on the corresponding investment for vocational and technical education in agriculture for the nation, for regional and commodity sectors, and for the associated agribusiness sectors. As it estimates the work force and skill requirements in agriculture, the study also estimates further migration of labor and population from agriculture and the manner in which vocational and technical education of the rural community can be adapted so that it appropriately serves both those who will stay on farms and those who will migrate. Changing technical and vocational training needs have been one of the most rapidly changing phenomena of the U.S. and will be even more rapid in the years ahead. The skill and knowledge needs of agriculture will change greatly in kinds and amount as the number of farms is halved in the next one and a half decades and as the farming industry becomes much more specialized.

While the industry will use less of both family and hired workers, the upcoming specialized nature of farming will place most of the agricultural labor force in two categories: (a) managers who perform some work but will be most importantly engaged in the scientific managerial or decision processes in a highly technical and precise farming process and (b) skilled workers who will serve as hired help but will need technical abilities beyond the requirements of the typical farm operator-laborer in the previous generation. While there will be some seasonal and unskilled labor remaining in the agriculture, this category will decline relatively in the next two decades. With the rapidly growing scientific orientation of farming, persons in local agribusiness operations which serve farming will need much greater and more sophisticated scientific and technical training. This need is reflected in the tendency whereby large chemical firms, through local representatives, are beginning to provide mathematically devised plans for farmers which incorporate all of the biological, physical and economic aspects of farm production and management. Such trends will require a high skill requirement, not only for the agribusiness personnel who must interpret the computer-divised plans for farmers, but also for the farmers who must put plans into operation.

This research project is pointed towards the changes in agriculture and its vocational and technical training requirements in the next one and a half decades. Hence, a large portion of the analysis relates to estimation of the structure of the agricultural work force and its skill requirements at future points in time. For parts of the analysis, however, it has been necessary to establish tendencies through estimation of regression equations based on time-series data and which allow projections into the future.

A. Objectives

1. To estimate manpower needs and labor demand in agriculture by 144 regions and nationally.
2. To relate manpower needs and skill requirements in agriculture to the structure and capitalization of farming and the scientific transformation of the industry.
3. To estimate manpower use and labor demand by categories including managers, temporary family labor, seasonal farm workers, permanent hired labor and other categories.
4. To relate the labor force of agriculture in terms of managers and workers to sizes, numbers, and structure of farms.
5. To estimate the off-farm labor force needed to serve agriculture through the agribusiness sectors providing farm input services.
6. To determine the interrelationships of all of the above sectors in the use and skill training of labor relating to agriculture.
7. To outline the types, nature and operational methods of vocational training and technical education best adapted to serve the future structure of agriculture (including agribusiness sectors) in terms of farm managers, skilled farm workers and the various crops and livestock enterprises of the industry.
8. To estimate the marginal productivity of different amounts and types of vocational education and technical training so provided.
9. To outline an educational and training policy better suited to meet the needs and structure of future agriculture and agribusiness sectors.

II. METHODS

The quantitative analysis has been by methods appropriate to the various phases of the study.

(1) The development and application of a mathematical programming model which allows specification for each of the 144 regions of agriculture and their major products and for the nation. This model, with the projection of technological change and the scientific transformation of agriculture has allowed the determination of the prospective structure of the nation's agriculture and the commodities, organization, degree of specialization, work force and skill requirements

by each region. Although the estimates can be derived for each specific region, the model is built to allow expression of the simultaneous interdependence among regions--an accomplishment possible only through this type of model. From these data, it has been possible to generate the regional characteristics by degree of specialization, farm numbers and work-force requirements.

(2) The estimation, regionally and nationally, of the manpower requirements for different classes of workers and skills. This analysis has required estimation of time-series regression equations containing appropriate variables endogenous to the model. Using this it has been possible to indicate the total demand for labor of various classes and to indicate the number needed to enter the industry annually.

(3) The estimation, regionally and nationally, of the migration of labor from farms, with subsequent measurement or indication of the destination of these persons. These data are generated as a basis for indicating the major types of vocational and technical education needed in the rural community for the share of the farm labor force that leaves agriculture.

(4) The application of input-output models to determine the interrelations among agricultural regions, agricultural commodities and the agribusiness sectors that serve agriculture through buying and selling activities. A matrix of interdependency coefficients has been established and has been used to suggest the effect on labor and on manpower and material requirements in the various regional, commodity and agribusiness sectors as change takes place in total demand and in the structure of a particular region or sector.

(5) The applicationof production functions that include variables representing different types and amounts of vocational training and education. The purpose of these estimates, insofar as they have been successful, has been to measure the marginal productivity of vocational and technical training or education.

(6) More general quantitative analysis which uses coefficients from general sources to convert the other estimates into manpower needs for different commodities, regions and labor classes and to project the total requirements for vocational and technical education in each of these categories.

III. RESULTS

Results are reported by methods and phases.

Each of the six categories of quantitative estimates explained above represents a fairly substantial empirical study. While data and time difficulties have occured some results are available in all categories. In addition to the quantitative analyses, the study also involves a policy or interpretative analysis to translate the empirical results into a specification of the amount, types and location of investment in vocational training and technical education for agriculture and for the agribusiness sectors of rural communities. The latter step involves, not only specification of the amount of facilities and investment needed by regions, but also a specification of curricula and course contents to conform with the developing structure of agriculture relative to the changing scientific and management characteristics of the industry and the stratification of labor into different groups than have prevailed in the past. Results by the phases and methods are outlined below:

(1) Programming projections of United States agricultural structure to the future, with indication of the production pattern, farm sizes and numbers, degree of specialization and work force by regions.

This analysis has been applied to 144 agricultural regions. It considers the 144 regions simultaneously since the degree of agricultural specialization and structural change of one region depends on the relative advantage and role of other regions in meeting national food demands. This large-scale analysis has been applied for 1975 and 1980 and shows (a) regions which should shift to a different set of crop products and enterprises in the future, (b) the regions which will become more intensive and those which will be more extensive and decline most in manpower use, (c) the number and sizes of farms and the capital inputs and the labor force by regions and (d) other items relating to manpower and skill needs of farming.

The programming model developed for this step in the analysis involved 800 equations and 2,200 variables. Three solutions have been obtained with all major crops incorporated into the model. A large empirical task was involved in accumulating and readying the data for the computations and in trial runs on the computer, and only crops have been considered. The addition of livestock, realistic labor requirements and restraints requires that the model be extended to approximately 4,000 equations and 35,000 variables. This addition is under consideration but has not provided useful results yet.

The basic model in which crop products will be produced in each of the 144 regions for future years allows for the specification of the total labor requirements in individual regions. The model indicates that some large regions, such as southeastern Wyoming, southern Colorado, parts of Missouri and many areas of the Southeast will shift from crops to forages and livestock, thus requiring different amounts of and skills for farm labor.

The actual model completed through the stage of machine computations can be summarized as follows, where notation is provided only for each single region:

The basic manpower requirements, L_j, for the jth region (an individual one of the 144 regions) is determined as follows:

$$(1)\quad L_j = \sum_{e=1}^{t} \sum_{k=1}^{n} \alpha_{gjk} \beta_{gjk} X_{ejk}$$

where α_{gjk} is the amount of each type of standardized labor used for the gth farm operation on the kth product in the jth farm region, β_{gjk} is the amount of the gth farm operation used on the kth crop, and X_{ejk} is the amount of the kth product produced by the eth technology in the jth farm region. Summation is over crops and types of technology in the region.

The labor outcome for any one region can be determined only by total national demands, the labor and farm technology in all other regions for meeting these demands and the comparative advantage of the particular region. Hence, the model must include equations which express the restraints to production in each region, the labor-capital methods used and the general technology in the regions.

Total production in the ith region is restrained by the total cropland equation (2).

$$(2)\quad b_{io} \geq \sum_{k=1}^{4} a_{ijk} X_{jk} \qquad (i = j = 1, 2, \ldots, 144),$$

and by the intraregional upper bounds on acreage for each crop in equation (3).

$$(3)\quad b_{ik} \geq a_{ijk} X_{jk} \qquad (i = j = 1, 2, \ldots, 144;\ k = 1, 2, 3, 4)$$

Minimum requirements for wheat, feed grains, and oilmeals in each consuming region are reflected in equations (4), (5) and (6), respectively.

$$(4)\quad d_{m1} \leq \sum_{j=1}^{n} X_{j1} P_{j1} + \sum_{r=1}^{31} T_{mr1} - R_s \qquad (m, r=1, 2, \ldots, 31;\ r \neq m);$$

$$(5)\quad d_{m2} \leq \sum_{j=1}^{n} X_{j2} P_{j2} + \sum_{r=1}^{31} T_{mr2} + R_s \qquad (m, r=1, 2, \ldots, 31;\ r \neq m);$$

$$(6)\quad d_{m3} \leq \sum_{j=1}^{n} X_{j3} P_{j3} + \sum_{r=1}^{31} T_{mr3} \qquad (m, r=1, 2, \ldots, 31;\ r \neq m).$$

The single national demand for cotton lint is specified as:

$$(7)\quad d_c \leq \sum_{j=1}^{144} X_{j4} P_{j4},$$

The symbols used in equations (2) through (7) are defined:

a_{ijk} = The amount of land used by one unit of the kth producing activity of the i=jth producing region; k=1 for wheat, 2 for feed grains, 3 for soybeans, and 4 for cotton.

b_{ik} = The amount of land available for use by the kth crop in the ith producing region.

b_{io} = The total cropland available for production in the ith producing region.

c_{jk} = The cost of producing one unit of the kth crop in the jth producing region.

c_{mrp} = The cost of transporting one unit of the pth crop to (from the mth demand region from (to) the rth demand region; r=30 is the maximum number of such activities that may occur for any crop since there are 31 demand regions.

c_3 = The cost of using one unit of wheat as a feed grain in the sth demand region (s=m). The cost is an artificial price differential in addition to the normal production costs.

d_c = The national demand for cotton lint expressed in pounds

d_{mp} = The demand for the pth commodity, expressed in feed units, in the mth demand region; p=1 for wheat, 2 for feed grains, and 3 for oilmeals.

P_{jk} = The per-unit output of the kth activity in the jth producing region, expressed in feed units for all except cotton lint, which is expressed in pounds.

$P_{j4'}$ = The oilmeal output, in feed units, of the cotton activity in the jth producing region.

R_s = The level of the activity transferring wheat into a feed grain in the sth demand region (m=s).

T_{mrp} = The level of transportation of the pth commodity to (from) the mth consuming region from (to) the rth consuming region.

X_{jk} = The level of the kth producing activity in the jth producing region.

The results of this model indicate some major regional changes for agriculture and its manpower requirements in the next

10 and 15 years. While the greatest number of the 144 regions will intensify their production, they also will become more specialized with a different emphasis in technology. However, a large number of regions in the fringe areas of the Great Plains and Corn Belt and over wide reaches of the Southeast are indicated to shift from present crop concentration to forage and livestock or forest farming. The labor requirements and manpower needs vary accordingly.

Results are summarized below. For convenience, they have been aggregated into the areas of the ten farm production regions of the U.S. Department of Agriculture.[1] All results presume the following conditions: continuing feed grain program trend level of exports to 1980, and a balance of supplies and demands of food for 243.4 million people in 1980.

a. Production

The pattern of production from agriculture in 1980 is suggested by the components of table 1. Four types of production; wheat, feed grains, soybeans and cotton are considered, and excess capacity in land is also summarized in this table. Information is given for each of the ten regions, and for the U.S. nationally.

From this table the following major changes can be noted. (Other smaller changes can also be noticed but attention here will be focused on the large changes which will be more significant in policy making). Wheat production is expected to increase by an over-all amount of 26.8 percent, from 1965. This amount includes allowances for changes in yields per acre. The increase in acreage used is expected to occur in all regions except the Delta States. Increases of up to 84.5 percent are projected, with the largest increases occuring in the Northeast, Lake States and Southeast regions. A reduction of 70 percent of the acreage planted in 1965 is expected in the Delta States region.

A net decrease in the acreage planted to feed grains is expected by 1980. An over-all decline of 9.9 percent is projected for this category. The amount of the decrease is moderate (2-23 percent) in most regions. Exceptions occur in the Delta States region and in the Mountain States. A very large decrease in feed grain production (69.2 percent) is projected for the Delta States region and a decline of about half that level (30.8 percent), is projected for the Mountain region. Small increases in the acreages planted to feed grains are projected for the Lake, Appalachian and Southeast regions, through 1980.

Soybean production for 1980 shows several very marked changes from 1965. An over-all change of +24.7 percent is projected, but individual regional changes range from +204.0 percent to -26.4 percent. Very large increases are projected for the Northeast and

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[1] For a definition of each of the ten regions see Appendix Table A 1.

Table 1. Changes in type and location of production, 1965-1980

	Wheat			Feed Grains			Soybeans		
Region	1965	1980	%	1965	1980	%	1965	1980	%
Northeast	786	1,460	+84.5	3,267	2,512	-23.1	443	1,347	+204.0
Lake States	1,671	2,630	+57.4	13,857	14,475	+ 4.5	3,781	3,272	- 13.5
Corn Belt	5,181	6,543	+26.3	35,027	31,017	-11.4	19,024	25,478	+ 33.9
Northern Plains	21,776	27,198	+24.9	21,633	18,844	-12.9	2,178	4,436	+103.7
Appalachian	687	782	+13.8	4,668	4,923	+ 5.9	2,247	1,759	- 21.8
Southeast	200	302	+51.0	3,883	4,110	+ [illegible].8	1,314	2,394	+ 82.2
Delta	559	164	-70.7	1,103	340	-69.2	5,300	3,904	- 26.4
Southern Plains	7,975	9,539	+19.6	8,304	7,108	-14.4	264	486	+ 84.0
Mountain	7,105	9,208	+29.6	4,342	3,006	-30.8	0	0	-
Pacific	3,373	4,694	+39.2	2,872	2,810	- 2.2	0	0	-
U.S.	49,313	62,520	+26.8	98,956	89,165	- 9.9	34,551	43,076	+ 24.7

Table 1 (continued) Changes in type and location of production, 1965-1980

Region	Cotton 1965	Cotton 1980	Cotton %	Idle Land 1965	Idle Land 1980	Idle Land %
			(Thousands of acres of land used)			
Northeast	0	0	-	1,334	390	- 70.8
Lake States	0	0	-	5,428	4,332	- 20.2
Corn Belt	336	320	- 4.8	10,820	6,949	- 35.8
Northern Plains	0	0	-	15,111	10,234	- 32.3
Appalachian	891	640	-28.2	3,230	3,529	+ 9.3
Southeast	1,898	46	-97.6	4,257	4,632	+ 8.8
Delta	3,133	2,109	-32.7	1,255	4,749	+278.4
Southern Plains	6,120	6,517	+ 6.4	8,146	7,062	- 13.4
Mountain	518	615	+18.7	5,084	3,605	- 29.1
Pacific	725	712	- 1.8	1,285	70	- 94.6
U.S.	13,621	10,959	-19.5	55,968	45,552	- 18.6

Northern Plains. Substantial increases are projected for the Southeast and Southern Plains regions. Reductions in acreages planted to soybeans are expected in the Lake States, Appalachian and Delta States regions.

When cotton production is considered, an over-all reduction in cotton acreage of 19.5 percent is projected. In general, the southeastern states are the lossers while the southwestern states including the Southern Plains and Mountain regions are net gainers. Changes are moderate in all areas except the Southeast where a substantial decline in cotton production is anticipated (97.6 percent).

The net result of these projected changes in production and land use, is a decrease in the amount of idle farmland. The total change for the United States is -18.6 percent. There are strong regional contrasts however. Presently idle land in the Northeast, Lake States, Corn Belt and Northern Plains, Mountain and Pacific States regions, are expected to be used more fully in 1980. Substantial decreases in the amount of idle land are projected for the Northeast and Pacific regions. In the South, less land will be needed for agriculture. The decrease will be small in Appalachia and the Southeast region but very large in the Delta States region.

This then is the pattern of production anticipated for 1980. Most noticeable in the over-all picture, is the widespread reduction in all types of agricultural output in the Delta States region; the large increases in soybean production in the Northeast and Northern Plains; and the big reduction in cotton acreage in the Southeast. The substantial changes in amounts of idle land in the Northeast, Delta States and Pacific regions are also notable. These changes in production point the way to other changes in the structure of agriculture in 1980.

b. Resource Use

Very generally, productive resources can be divided into three large groups: land, labor and capital. Measures of each are available for the allocation of production indicated above for 1980. These are, of course, very generalized groupings but are included here to give a general idea of the types of changes in inputs which will be associated with the projected changes in production and output.

i. Labor

The manhours of farm labor required to service the production indicated for 1980 have been estimated by applying technical coefficients for manhours of labor per unit of output in 1980 projected production. The results are shown in table 2. In total, a reduction of 31.9 percent in the manhours of labor required is projected. This reflects

Table 2. Manhour farm labor requirement: for all farm work in 1980 with comparisons to 1965 and percentage changes 1965-1980

Region	1965	1980	Percent Change 1965-1980
		(Million Manhours)	
Northeast	762	404	-35.6
Lake States	849	604	-28.9
Corn Belt	1,309	870	-33.5
Northern Plains	630	451	-28.4
Appalachian	1,157	716	-38.1
Southeast	801	484	-39.6
Delta States	594	352	-40.6
Southern Plains	709	499	-29.6
Mountain	470	376	-20.0
Pacific	830	679	-18.2
U.S.	7,976	5,435	-31.9

factors of increasing technical efficiency and continuing capital substitution for labor. Regional estimates of the amount of farm labor required vary between -18.2 and -40.7 percent, the greatest reduction being expected in the Delta States region.

These changes are not of the same order of magnitude as those associated with production. This reflects the switching of labor between enterprises within regions. The number of manhours required in aggregate in 1980 are never-the-less lower than levels current in 1965.

When converted to numbers of people, the 1980 estimates indicate a continuation of the decline in the number of people employed in farming. The simplest projection possible suggests 3.8 million people employed in agriculture in 1980 as compared to 5.6 million in 1965. This projection is based on applying the 1955-1965 national average manhours per-man coefficient to the estimates of manhour requirements reported in table 2.

Regional requirements using this same technique could have been calculated but have not been, as the results of doing so would be no more than a transformation of the information in table 2. Alternative techniques for estimating numbers of people appear later in this report.

ii Capital Requirements

Capital requirements have been estimated for the production indicated in table 1. These requirements are shown in table 3. Estimates include allowances for capital used in land and buildings, machinery and equipment, and livestock inventories. The pattern of changes in capital use shown in table 3 is one of increases in all regions. Five of the ten regions show increases of more than 40.0 percent, over 1965 and there are no increases of less than 20.0 percent.

These changes are in contrast to those predicted for farm labor. In table 2 negative changes in farm labor use are consistantly projected while positive changes are just as consistantly projected for farm capital. Apparently, the substitution of capital for labor in agriculture will continue unabated into the future.

iii Number of farms

Another statistic useful in defining the structure of agriculture in 1980 is the number of farms. Two sets of estimates of this statistic are available. The first of these estimates is the census of agriculture estimate. Information on this statistic is available from each of the quinquenial census's. Better, however are the estimates of the number of farms made by the U.S. Department

Table 3. Total capital requirements in 1980 with comparisons to 1965 and percentage changes 1965-1980

	1965	1980	Percent Change 1965-1980
	(Millions of Dollars)		
Northeast	10,924	13,193	20.8
Lake States	16,065	23,690	47.5
Corn Belt	45,044	61,540	26.6
Northern Plains	23,043	33,705	46.3
Appalachian	15,022	18,223	21.3
Southeast	12,597	15,432	22.5
Delta States	9,191	12,388	34.8
Southern Plains	24,154	34,621	47.3
Mountain	16,989	24,713	45.5
Pacific	25,862	38,049	47.1
U.S.	198,890	275,554	+38.5

of Agriculture. These estimates are made annually, interpolate between census reports, employ state annual estimates and allow for underenumeration in the census count. (On account of this last fact the U.S.D.A. statistics are generally eight to ten percent higher than the census estimates).

The number of farms in 1980 has been estimated using the U.S.D.A. data. To define the trend in each of the ten farm production regions two equations were considered: These were

$$Y = a + bT$$

and

$$Y = ae^{bT}$$

These equations were fitted to data for the years 1945-1965 and one equation was selected from the two on the basis of best fit and best prediction of the 1966 number of farms. The results of projecting the number of farms by this procedure are given in table 4.

Table 4 also includes estimates of the average size of farm for both 1965 and 1980. These estimates of farm size were made by dividing the land in farms in 1965 by the number of farms for each year.

The largest changes in the number of farms are expected in the Northeast, Southeast and Delta States regions. Substantial changes are expected in all regions with the national average decline being 41.4 percent. Farm sizes vary accordingly.

This survey then defines the anticipated structure of agriculture in 1980 in a very general way. Large decreases in the numbers of farms and in the farm labor force are expected. Capital commitments will increase and shifts in the location of some types of production are anticipated. Against this general background details of the labor force and its education can be considered.

2. Regional and National Estimates of Manpower Requirements for Different Classes of Farm Labor

The estimates presented in table 2 were for manhours of labor required to operate United States agriculture in 1980. As a measure of labor input this may be satisfactory but in terms of providing manpower estimation for predicting educational requirements for people entering and working in agriculture, this kind of estimate is less useful. For this latter purpose a count of the number of people involved in agriculture is better. Accordingly the emphasis in the research reported in this section has been on numbers of people involved in agriculture.

Table 4. Projected numbers and sizes of farms in 1980 with comparisons to 1965 and percentage changes, 1965-1980

Region	Number of farms 1965	 1980	 Percent Change 1965-1980	Average Size of farms 1965	 1980	 Percent Change 1965-1980
	(thousands of farms)				(acres)	
Northeast	254	127	-50.0	149	299	+100.6
Lake States	368	228	-38.0	184	298	+ 62.0
Corn Belt	710	415	-41.5	191	326	+ 70.7
Northern Plains	282	200	-29.0	659	930	+ 40.1
Appalachina	604	374	-38.0	113	182	+ 60.1
Southeast	293	147	-49.8	205	410	+100.0
Delta States	252	122	-51.6	188	390	+107.4
Southern Plains	288	175	-39.2	636	1,047	+ 64.6
Mountain	147	91	-38.1	1,862	3,008	+ 61.5
Pacific	186	101	-45.7	414	762	+ 84.1
U.S.	3,374	1,980	-41.4	337	574	+ 70.3

A method for converting the manhour requirements to numbers of people using a technical factor has been suggested above. In general this is not a very satisfactory technique as it relies heavily on a single technical conversion factor. An alternative method is the following. Individual farm employment equations are first derived. Then, assumptions are made about the trends in the independent variables of these equations and farm employment of future dates is projected using the trend data and the farm employment equations. This methodology allows different categories of farm labor (i.e. hired and family) to be separated. In addition, regional equations can be developed. These can be used to more accurately define the trends in farm employment.[1] This approach has been used with the following results.

Farm labor use, in terms of the number of people employed, in agriculture, is expected to decline by 35.9 percent nationally between 1965 and 1980. This change can be subdivided and documented as shown in table 5.

In this table, hired and family labor have been projected seperately. Total labor requirements are the sum of hired and family requirements.

Regional changes in total farm employment vary from 25.3 to 50.2 percent of 1965 levels. All changes are negative. Hired and family labor decline by varying amounts as between, and within regions. The over-all national aggregate of hired and family changes never-the-less suggest the continued maintainance of about a 1:3 ratio between hired and family workers.

As between the different regions, the greatest changes are expected to occur in the Delta States region. In this region hired labor is projected to decline by 58.9 percent and family labor by 44.8 percent. The smallest changes in hired labor use are expected in the Pacific and Lake States regions while the smallest declines in family labor employment we projected to occur in the Mountain and Northern Plains regions. These conclusions, are consistent with those conclusions stated above about the allocation of production in 1980.

Outmigration

From the point of view of planning and policy, percentage figures for the changes in farm labor use throughout the United States may not be as useful as a measure of the absolute changes expected between 1965 and 1980. These are expressed in table 6. The largest numerical outmigration is thus projected to occur in the Corn Belt region, declines in hired labor are however, higher in the Delta States, Southern Plains, Southeast, Appalachian and Northeast regions, than in the Corn Belt. Over-all, a total outmigration of 2.0 million farm workers is projected to take place between 1965 and 1980.

3. Agribusiness employment

For the purposes of this report agribusiness employment will be defined as that off-farm labor force needed to provide the farm input

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[1] For details of this technique see (2).

Table 5. Farm employment projections for 1970-1975 and 1980 with comparisons to 1965 and percentage changes 1965-1980

Region	Type	1965	1970	1975	1980	Percent Change 1965-1980
			(thousands)			
Northeast	Hired	130.0	114.2	93.3	77.6	-40.3
	Family	327.0	294.4	252.8	220.7	-32.5
	TOTAL	457.0	408.6	346.1	298.3	-34.7
Lake States	Hired	86.0	83.0	72.8	63.8	-25.8
	Family	544.0	482.2	411.9	351.7	-35.4
	TOTAL	630.0	565.2	484.7	415.5	-34.0
Corn Belt	Hired	142.0	133.5	112.8	95.4	-32.8
	Family	884.0	777.2	662.1	564.0	-36.2
	TOTAL	1,026.0	910.7	774.9	659.4	-35.7
Northern Plains	Hired	60.0	54.6	48.7	44.0	-26.7
	Family	351.0	318.4	281.9	252.8	-28.0
	TOTAL	411.0	373.0	330.6	296.8	-27.8
Appalachian	Hired	230.0	221.4	195.4	167.7	-27.1
	Family	711.0	604.6	498.3	416.3	-41.4
	TOTAL	941.0	826.0	693.7	584.0	-37.9
Southeast	Hired	184.0	171.0	144.5	116.9	-36.5
	Family	323.0	274.2	227.6	192.3	-40.5
	TOTAL	507.0	445.2	372.1	309.2	-39.0
Delta	Hired	172.0	144.6	107.2	70.7	-58.9
	Family	281.0	233.9	187.8	155.0	-44.8
	TOTAL	453.0	378.5	295.0	225.7	-50.2
Southern Plains	Hired	135.0	122.3	92.2	60.0	-55.5
	Family	296.0	267.6	227.7	196.6	-33.6
	TOTAL	431.0	389.9	319.9	256.6	-40.5
Mountain	Hired	99.0	88.2	75.3	64.3	-35.1
	Family	174.0	161.3	142.9	126.6	-27.3
	TOTAL	273.0	249.5	218.2	190.9	-30.1
Pacific	Hired	246.0	239.5	219.2	200.6	-18.5
	Family	234.0	222.5	189.4	156.5	-23.1
	TOTAL	480.0	462.0	408.6	357.1	-25.3
National	Hired	1,484.0	1,372.3	1,161.4	961.0	-35.9
	Family	4,125.0	3,636.3	3,082.4	2,632.5	-36.1
	TOTAL	5,609.0	5,008.6	4,243.8	3,593.5	-35.9

Table 6. Projected outmigration of hired, family and total farm workers, 1965-1980

Region	Hired	Family	Total
	(Thousands of persons)		
Northeast	52.4	106.3	158.7
Lake States	22.2	192.3	214.5
Corn Belt	46.6	320.0	366.6
Northern Plains	16.0	98.2	114.2
Appalachian	62.3	249.7	312.0
Southeast	67.1	130.7	197.8
Delta States	101.3	126.0	227.3
Southern Plains	75.0	99.4	174.4
Mountain	34.7	47.4	82.1
Pacific	45.4	77.5	122.9
U.S.	523.0	1,4477.5	1,970.5

and marketing services. This definition is broader than "agricultural occupation" as defined by the U.S. Office of Education (12).

> "An agricultural occupation means an occupation involving knowledge and skills in agricultural subjects which has the following characteristics:
> (a) The occupation includes the functions of producing, processing and distribution of agricultural products and includes services related thereto.
> (b) The occupation requires competencies in one or more of the primary areas of plant science, soil science, animal science, farm management, agricultural mechanization, and agricultural leadership."

Therefore, as here defined agricultural occupations are a subset of agribusiness employment which requires a certain degree of competency or training in agriculture. Our interest in agribusiness employment is from the standpoint of anticipating future changes and levels in employment levels and skill requirements of the agribusiness labor force that will insure an economically and socially optimum flow of supply and marketing services to the farm sector of our economy. Our interest in agricultural occupations is two-fold. As the adjustment of labor from farms is accomplished it would seem logical that one of the first alternative employment opportunities investigation should be in an occupation in which some of the skills and experience accumulated in farming may have a marketable value. This would seem to include all agricultural occupations which are not in the producing sector of agriculture. Secondly, we are interested in agricultural occupations since this is the clientele of which the vocational agriculture system is designed to serve the training needs. Therefore, the future allocation of resources into this institution should be to a large degree dependent upon the anticipated size and regional distribution of employment opportunities in agricultural occupations.

There are no purely agricultural marketing industries but rather industries that use farm products as primary or secondary inputs in their industrial operations. Likewise in the ag-supply industries, there are only industries of whom proportions of their primary and secondary production are sold to the production component of the agricultural sector. Therefore the most logical approach to defining an "agribusiness" sector would be in terms of an inter-industry model.

It was the initial intention of this project to take this approach, through use of an input-output model of the conventional Leontief type. This model consists of nine agricultural commodity sectors within each of ten geographical regions, seven agricultural processing and five agricultural supply nationally defined and an all-inclusive non-agricultural sector. This approach relates the flows of each and all of these regional and commodity sectors to one another. Therefore, this model could be used to determine the effects of changes in national population and food demand on the input and labor requirements of agriculture and their indirect requirements on the various other sectors. These demands could then be reflected into labor requirements in the agribusiness sectors. A model of this form has been constructed for 1959 and the project plans were to construct a similar one for 1964 to allow projections of trends. However, the necessary data has only recently become available and the sizeable task of collecting and tabulating this data, although proceeding steadily is not sufficiently complete to be included in this report. While the analysis is not available, an analysis of existing information suggests a possible direction of these trends. Table 7 provides employment data from the 1963 Census of Manufacturers and the 1966 Annual Survey of Manufacturers for each of the agribusiness sectors defined in the input-output model. Columns 6 and 7 reflect the relative importance of sales to and purchases from farms for each sector. Column 6 is the proportion of total purchases of the particular sector that was purchased from the producing sectors in 1959 (i.e. the input-output coefficient in producing row of the sector column). Column 7 is the proportion of total sales of that particular sector which were represented by sales to the producing sector of agriculture. As indicated in column 6 the agricultural processing sectors; meat and poultry processing, dairy products, grain processing and tobacco, all closely related to farming, showed a net decline in total employment of 4 to 19 percent from 1958 to 1964. Textile products and miscellaneous food processing, less dependent on farming, held their employment about constant. Vegetable and fruit processing, reflecting the growth in the frozen food industry was the only agricultural processing sector which experienced an increase in employment; the increase being approximately 11 percent between 1958 and 1966.

Column 7 indicates that two of the agricultural supply sectors are heavily dependent upon sales to agriculture. These two, prepared animal foods and fertilizer, maintained a relatively constant level of employment during the 1958-1966 period. The other three supply sectors; chemical products, machinery and related services, and petroleum products are much less dependent upon agriculture as a market for their products. Therefore, although there was a 23 percent increase in their employment it appears unlikely that this indicates a substantial increase in employment opportunities in agricultural related occupations.

While table 7 reflects the employment in agribusiness manufacturing establishments. Table 8 lists the employment in selected sectors of the wholesale-retail trade. This table shows that there was a modest growth of 4 percent in retail trade and 5 percent in wholesale trade in agribusiness employment from 1958 to 1963.

Table 7. Employment in agribusiness sectors reported in 1963 Census of Manufacturing and 1966 annual survey of manufacturing[1/]

	(1) 1954	(2) 1958	(3) 1963	(4) 1966	(5) 1966/58	% of total purchases made from farms	% of total sales made to farms
Meat & Poultry processing	283,428	311,994	299,576	297,516	.9535	.59774	----
Dairy products	283,428	294,805	256,396	238,868	.8102	.47328	----
Grain processing	50,052	47,879	43,403	41,347	.8636	.45907	----
Prepared animal feeds	59,890	57,313	54,649	51,401	.8968	.16748	.84610
Misc. food processing	756,687	735,272	710,938	722,752	.9824	.04303	----
Vegetable & fruit processing	----	233,966	244,824	259,098	1.1074	.34268	----
Tobacco	94,862	84,467	77,330	72,363	.8567	.20893	----
Textiles	----	688,647	642,760	658,564	.9955	.21320	.00413
Fertilizers	31,768	30,889	33,744	36,486	1.1929	.00229	.70103
Chemicals	----	700,403	734,748	815,350	1.1641	.03716	.00869
Machinery & related services	----	834,289	945,339	1,151,871	1.3807	----	.06068
Petroleum	163,240	155,849	129,225	115,727	.7426	----	.04745
Total Manufacturaing		4,175,773	4,172,932	4,488,343	1.0748		

[1/] Source: (8, 11)

Table 8. Employment in wholesale and retail agricultural establishments based on 1963 census of business [1]

	1954	1958	1963	1963/1958
Farm equipment dealers	79,625	81,044	77,476	----
Hay, grain and food stores	----	58,083	54,474	----
Other farm supply	----	23,718	26,894	-----
Garden supply	----		10,281	----
Total retail	----	162,845	169,125	1.0386
Groceries and related products	----	480,392	503,331	----
Farm products - raw materials	----	116,918	118,690	----
Farm and garden machines and equipment	----	21,059	23,976	----
Farm supplies	----	21,507	25,396	----
Total wholesale	----	639,876	671,393	1.04925

[1] Source: (10)

This employment data is not complete. It is nationally defined and does not include several areas of agricultural occupations such as agricultural credit and nurseries. A more complete study would seem to be warranted which would provide a more complete geographical breakdown as well as perhaps employment trends on an industry basis. However, these estimates would seem to support one noteworthy conclusion. Nationally, it is unrealistic to expect the agribusiness occupations to absorb the off-farm migration, in fact these occupations themselves may be expected to experience an adjustment of labor to other occupations.*

Any consideration of future employment opportunities in nonfarm occupations must consider the impact of technological innovation and changes in the structure of the farm firm upon the nature of the agribusiness firm.

(a) Agricultural Supply Industries

The impact of the trend to larger sized farms will have a more apparent effect upon agricultural supply firms than on agricultural processing firms. As the farmer controls more resources and purchases more inputs annually he may use this as a bargaining tool. By pooling his annual purchases he is in a stronger position to get prices and/or service concessions from the farm supply store. This development would put the large diversified service center that can provide the farmer all the inputs he needs and can provide technical advice at a comparative advantage. This one stop service concept may necessite some drastic social adjustments and changes in trade patterns but would allow savings in volume handling of inputs and allow the employment of technical specialists to provide technical advice to the producer. This development would likely result in a lower demand for farm supply industry employees, but a more highly skilled labor force than presently engaged. Allen (1) sees the most significant future developments as costs reducing influences in the fertilizer industry and a further shift away from the commercial portable grinder-mixer units in the manufactured feed industry. A potential altering influence on the manufacturing feed industry would be the shift in the Corn Belt to larger livestock feeding units comparable to the commercial feedlots in the West. A shift to complete feed purchasing would result in an increase in demand for the producer and service of the feed industry whereby vertical integration by the feedlots to include their own feed mill could have a substantial impact on feed firms due to their loss of large customers.

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* From 1958 to 1966 the total employment in all manufacturing establishments including central administrative offices increased from 16,960,938 to 19,065,997 or 12 percent which is more than in employment growth in all but three of the twelve defined agribusiness sectors.

Sims (7) provides an excellent summary statement.

> "The implication of structural changes in the economy of the commercial firms to farm supply firms are numerous. The farmer will become a more sophisticated purchasing agent and will demand and receive a price which will result in a narrower margin for the farm supply firm. He will continue to concentrate his volume and to bargain more effectively. The farmer will seek additional services which will help him solve his technical problems, his credit and capital problems and he will expect to exploit the new developments of research carried on for him.
>
> The supply firm will employ greater amounts of capital and a higher caliber of people to meet the demands of tomorrow's farmers. More highly skilled people as farm operators must be matched by improved management in farm supply firms. More emphasis will be placed on merchandising as compared to production. The narrower margins will be overcome by greater volume, further integration-both horizontal and vertical, additional efficiencies, and by new developments which result from research and innovation."

In short, farm supply firms are and will be experiencing the same substitutions of capital and highly skilled labor for low skilled labor, that has so drastically affected farming.

(b) Agricultural Processing Firms

Several trends in agricultural processing firms also suggest a substitution of capital for labor. The impact of more modern automated meat packing plants built out near the supply of meat animals has lowered employment in the meat packing industries as well as caused a shift to more direct buying of livestock from the producer which has diminished the importance of terminal markets in livestock marketing. The impact of the interstate highway system and improvements in inland waterways has had and will have a substantial impact on the traditional reliance on rail transportation for grain hauling. Changes in production technology, such as the increased popularity of picker shellers for harvesting corn which increases the demand for off-farm storage at harvest-time, influence the structure and organization of agricultural marketing and processing industries. It becomes almost trite by repetition but one predictable impact of innovations by technological change or by structural change is an increase in the level of skills of the existing labor force.

4. Labor Movements Between Farm and Nonfarm Locations

One of the relevant questions concerning this study was whether the people who left farming entered agricultural related occupations in the nonfarm sector.

Two approaches were investigated to attempt to answer this question.

One was to review the work of researchers who conducted follow-up studies of the employment of former enrollees in vocational agriculture. Bishop (3) reviews a summary of studies of employment of former vocational agricultural students. These studies were made during the period 1918-1960. Nationally these studies showed 33.3 percent of former vocational agricultural students engaged in farming and 7.6 percent employed in farm related occupations when the studies were conducted. Studies since 1960 reviewed by Warmbrod and Phillips (14) seem to reflect the increased emphasis upon training for farm related occupations. They report on average 10-16 percent of former enrollees now engaged in nonfarm occupations related to farming.

These studies suffer from two weaknesses. All farm boys do not take vocational agriculture, and the proportion who do not is not uniform throughout the nation. Thus the influence of the South, a region where a larger proportion of rural students enroll in vocational agriculture and also the region where the largest farm labor adjustment is taking place, is disproportionately felt. Finally most of these studies were made on students one or three years out of high school. Thus there is no assurance that the occupations reported are other than transitional employment until their selective service obligation has been met. Longer range studies suggest that this may have been the case since the percentage of graduates engaged in nonfarm agricultural occupations and non-agricultural occupation increase as the number of years from graduation increases.

In any case they were farm boys and they were trained in agriculture and yet 55-60 percent of them did not enter farming or agriculture-related occupations and this was a trend which has persisted since 1918 (Bishop found a similar trend has existed during the 1946-61 period). Thus, the evidence suggests only a small proportion of the off-farm migrants stay in ag-related occupations.

A second study reviewed was by Perkins and Hathaway (6). This unique study utilized a continuous register sample of Social Security records which made it possible to follow individuals from one year to the next. Their sample comprised a sample of employment records for the period 1955-59 of individuals with Social Security coverage from agricultural employment in any of the years in the period. They found during the period 1955-59 the estimated annual mobility rate from farm to nonfarm employment was 14.1 percent, nonfarm to farm was 12.5 percent while the average entrance and retirement rates were 3.0 and 4.8 percent, respectively.

Table 9 summarizes the industries to which off-farm movers migrated. Unfortunately no attempt was made by the researchers to further disaggregate the industry classifications, i.e. to agricultural related occupations, but again there is no clear evidence that off-farm migration was to ghe agri-business industries.

This inference is reinforced by a comparison of the distribution of the jobs of off-farm movers among industries, with the distribution of jobs of unskilled labor among these same industries. The last column of table 9 presents this distribution for the least skilled nonfarm occupations, operators and kindred workers, service workers and nonfarm laborers. The striking similarity between this distribution and both the distribution of farm operators jobs and of farm laborers jobs would indicate these would be comparable classes of laborers. This would further imply that in making this transformation from farm to non-farm employment, the off-farm mover did not bring any marketable skills with him. This suggests one of two effects; either the person found employment in an industry where agricultural skills were of no value or that the often suggested comparative advantage of an agricultural background is an agribusiness occupation is not an economic reality.

The differences in the distribution between the three groups seems to be confined to two industries; manufacturing where the incidence of movers jobs was fairly low and wholesale and retail trade where the incidence of movers jobs was fairly high. Possible explanations for this would be the omnipresence of trade occupations and ease of entry by movers due to a low level of unionization contrasted with the barrier of unionization in manufacturing. In 1960 fifty percent of all employees were union members in manufacturing versus seven percent in trades.

A further interesting finding of this study was that mobility could be predicted with a simple income expectation model. If a farm worker expected to earn more in non-farm employment he changed jobs; if not, he stayed on the farm. If his higher income expectation were realized in non-farm employment, he stayed; if not, he returned to farm employment.

In view of the fact that high off-farm mobility rates are almost offset by the high in-farm mobility rate, it would seem logical that an effective retraining program, which would allow the off-farm mover to develop a skill level such that his higher income expectation in off-farm occupations is met, would reduce the in-farm mobility rate.

On the basis of these two studies there seems to be no conclusive evidence that the logical move from a farm job is to one in an agricultural related occupation. Further, the data suggests that there may not be a developed market for agricultural skills in non-farm occupations.

5. Vocational Technical Education Expenditure and Payoff

Historically vocational education has been primarily funded at the local and state level but the federal contributions have had the most influence on the general pattern of expenditure of

Table 9. The industrial distributions of wage jobs taken by movers in the 1956-57 and the 1957-58 mobility periods by farm occupation of movers, and of all unskilled non-farm occupations in 1960[a]

Industry	Farm operators 1957 %	Farm operators 1958 %	Farm wage workers 1957 %	Farm wage workers 1958 %	Operatives and kindred workers, service workers and non-farm laborers 1960 %
Agriculture[b], forestry and fisheries	2.7	2.4	8.9	6.1	2.1
Mining	4.2	2.6	2.8	2.2	2.5
Construction	15.2	14.8	16.1	19.2	6.9
Manufacturing	22.3	21.3	23.4	21.5	42.4
Utilities	4.5	4.9	4.7	5.3	11.8
Wholesale & retail trade	18.1	21.9	24.6	26.3	15.5
Finance, insurance & real estate	2.3	2.4	1.7	1.7	1.0
Services	8.2	10.3	10.9	10.8	12.3
Government	21.1	17.9	4.8	5.3	4.9
Other[c]	1.3	1.5	2.1	1.4	0.5
All industries	100.0	100.0	100.0	100.0	100.0

---

[a] Distribution of movers' jobs based on Social Security sample data; distribution of unskilled occupations in 1960 computed from Census of Population

[b] Excluding farm employment

[c] Including non-classifiable and non-classified

Source: 6, page 21.

these funds. For each dollar of federal funds expended for vocational agriculture in the United States during 1964-65, $2.28 from state funds, and $2.50 from local funds were spent for the same purpose (the corresponding figure for all vocational education expenditures are $2.31, state and $2.94 local). These expenditures do not include amounts spent for land building, equipment, libraries, and teaching aids, which must be financed from state and local funds. Around $13,000,000 is appropriated annually from federal funds for vocational education in agriculture, under provisions of the Smith-Hughes and George-Barden Acts. These funds are allocated to states approximately in the proportion which each state's farm and rural population bears to the total farm and rural populations of the United States. The Smith-Hughes Act set up certain provisions which a state must meet to qualify for the funds. The two specific restrictions the Smith-Hughes Act placed on approved programs of vocational education in agriculture are:

1. Instruction must be designed to meet the needs of persons 14 years or older who have entered upon or who are preparing to enter upon the work of the farm or the farm home.

2. Each enrollee must receive at least six months directed or required farm practice each year.

Thus in order to be eligible for federal funds the orientation of the training in vocational agriculture programs had to be for training farmers. Since vocational agriculture was the only vocational education program available to a large number of rural young men the net result was either the youths were trained for an occupation in which employment opportunities were rapidly declining and only 1/3 of those so trained were able to find employment, or, alternatively, the youths could choose to receive no vocational training. This situation, counter to socio-economic trends, persisted from 1917 to 1963 and was accompanied by lack of initiative on the state and local school district level in developing other types of agricultural education adapted to public needs. Although the bulk of funds were provided at these two levels, the state boards, (which actually established the minimum standards which must be met by the local school districts) have chosen to reflect the federal orientation on agricultural education.

In 1963 the enactment of Public Law 88-210, commonly known as the 1963 Vocational-Education Act, dealt with some of these rigidities which made the allocation of vocational education funds less responsive to socio-economic trends and the national, state and local community and individual person needs.

This act ammended the George-Barden (1946) and Smith-Hughes(1917) Vocational Education Acts to permit funds earmarked for a specific occupational category to be transferred to any other category, broadened the definition of agricultural occupation to include farm-related occupations as well as farming, and allowed that this education could be provided without directed or supervised practice on a farm. A further progressive aspect of this act was a federal cost-sharing of construction costs of area vocational-technical schools. The area vocational school concept is especially applicable to rural areas since this would allow an adequate sized enrollment to provide a sufficiently varied program offering to meet the training needs of students and employers, and yet provide this training at an acceptable cost to the community. An additional provision established a formula for alloting the appropriate funds to the states on the basis of per capita income and the numbers of persons in three age groups in the respective states, the allocation formula is as follows:

> (1) Half of the funds would be allotted on the basis of the size of the 15-19 age group, (2) 20 percent on the basis of size of 20-24 age group; (3) 15 percent on the basis of size of the 25-65 age group, (4) 5 percent on the relative size of the first three groups, (5) the remaining 10 percent for research and development in vocational education

This feature makes the act much more responsive to changes in the socio-economic environment in the nation by not earmarking any specific amount for any occupational category and by tying state allocations to the size of the age group which would be more potential users of the training facilities.

The relevant question is, what the actual impact of this legislation has been. Vocational-technical education financial support and enrollment seem to have increased. A number of area schools are now in operation. However, an objective statistical description of enrollment and expenditures by state and occupational categories has not been possible on account of a lack of recent data in the published literature.

Regional Expenditure Patterns

The expenditure patterns of vocational education is by no means uniform between regions. Several of the areas in which these differences occur are (a) in the proportion of the total costs provided at each level of government, (b) the proportion of total vocational education expenditures going to agriculture and (c) in the total vocational expenditures per student. Again, it must be pointed out that these are pre-1963 vocational education act patterns which may have been modified.

Vocational Education Support by Level of Government

The extent to which local government provides the operating funds for vocational technical education varies quite appreciably between regions. As indicated in table 10 this varies from 78 percent in the Pacific region to 20 percent in the Southern Plains region.

Table 10. Percentage of total vocational education funds provided by each level of government in 1964 by regions

Region	Federal	State	Local
Northeast	16	41	43
Lake States	20	24	56
Corn Belt	22	27	51
Northern Plains	26	15	59
Appalachian States	17	50	33
Southeast	12	52	36
Delta States	17	23	60
Southern Plains	10	70	20
Mountain States	19	17	64
Pacific	13	9	78
National	16	37	47

It appears local support is heaviest in the western and northern parts of the nation and heavier state support is evident in the southern, central and eastern states. One possible consequence of heavy local support for vocational education in a mobile society is that this results in an implicit subsidization of growing areas by areas which are experiencing a population decline or a relatively slower growth. A crude check for evidence of this effect was made by computing a simple correlation between the ranking of states by population growth between 1960 and 1966 with a similar ranking of states by the proportion of total vocational education operating costs borne at the local level. A significant correlation was not found. The pattern of governmental support for vocational agriculture between regions was roughly parallel to that for all vocational education. The usual trend was for the federal and state proportion to be slightly higher and local to be slightly lower.

(b) Distribution of Vocational Funds to Agriculture

Due to the standard annual appropriation of a little over $13 million to vocational training in agriculture from the Smith-Hughes and George-Barden Funds with the accompanying incentives for matching expenditures at the state and local level, a disproportionate level of support has gone to this occupational category than would appear to be warranted by employment opportunities relative to the rest of the job market in the economy. As shown in table 11, in 1964 19 percent of all vocational students were enrolled in agriculture and 23.3 percent of total vocational education funds was allocated to this category. Thus with farm employment declining and farm related occupations not being in industries experiencing high rates of growth in employment opportunities this would seem to be an unusually high level of support for training for these occupations. The regional pattern of these levels of support shows a similar tendency. The percentage of vocational agriculture students of total vocational students varies from 4.7 and 5.4 percent in the Pacific and Northeast region respectively to 33.0 and 36.7 percent in the Delta States and Southern Plains regions respectively. The corresponding figures for expenditures for thesame regions are 13.4, 10.6 and 25.1 and 36.2.

(c) Expenditures per Student

Using data on expenditures on federally aided vocational and technical education programs a wide and enrollment in variability in expenditures per student is found between regions. As shown in table 12 the largest expenditure per student in vocational education programs is in the Northeast ($100) and it varies down to $54 in the Pacific States. The regional

Table 11. Percentage of total vocational education expenditures allocated to agriculture and percentage of total vocational education enrollments in agriculture by reions 1964

Region	Voc. Ag Ex. Total Voc. Ex.	Voc. Ag Students Total Voc. Students
Northeast	10.6	5.4
Lake States	25.1	16.1
Corn Belt	25.6	21.6
Northern Plains	33.2	22.0
Appalachian	28.4	26.4
Southeast	25.4	23.0
Delta States	35.1	33.0
Southern Plains	36.2	36.7
Mountain	25.2	12.9
Pacific	13.4	4.7
National	23.3	19.0

Table 12. Expenditures per student and enrollment all vocational education and and in vocational agriculture by regions and nationally in 1964

Regions	Expenditures per student		Enrollments	
	All Students	Voc Ag Students	All Students	Voc Ag Students
Northeast	100.08	197.42	677,120	36,376
Lake States	61.79	96.38	421,621	67,871
Corn Belt	86.15	103.27	506,722	109,471
Northern Plains	75.09	113.14	113,832	25,068
Appalachian States	79.22	85.03	519,770	137,207
Southeast	65.59	72.57	598,520	137,511
Delta States	61.35	65.39	283,997	93,603
Southern Plains	66.20	65.18	514,972	198,244
Mountain	77.63	151.93	174,896	22,841
Pacific	53.92	151.91	665,622	30,615
National	73.17	89.61	4,467,072	849,444

expenditures pattern for vocational agriculture finds the Northeast again with the highest expenditure per student (\$197) and at the lower end of the range the Delta States and Southern Plains region (\$65).

This data is too highly aggregated from which to draw clear inferences. The data refers only to those expenditures for which federal cost sharing is available. It would appear the high per vocational agriculture pupil expenditure in the four highest regions, would more nearly indicate high cost due to small enrollments than a high regional support for this type of training. Several general observations can be noted. The Southern regions are on the lower end of both ranges, and expenditure per student in agriculture tends to be higher than the average expenditure per student in all other vocational education.

(d) Payoff to Education

In investigating the payoff to education, the results of a study by Gisser (4) have been useful. This study employed a simultaneous equation specification of the demand for and supply of farm labor. The equations included a factor for education and were directly related to a Cobb-Douglas production function for agriculture. An inelastic demand for agricultural produce was assumed. Mathematically the formulation was as follows:

$$Q = a_6 L^{(1+a2)}\ C^{a3}\ S^{a4} \qquad (8)$$

$$P = C.Q^{1/e} \qquad (9)$$

$$W^* = a_1 . L^{a2} .\ C^{a3} .\ S^{a4} .\ R^{a5} .\ P \qquad (10)$$

$$W^* = b_1 .\ L^{b2} .\ W^{b3} .\ S^{b4} .\ R^{b5} .\ P \qquad (11)$$

where equation 8 is the production function for agriculture; equation 9, the demand function for agricultural products and equations 10 and 11 the demand and supply functions respectively for farm wages. The various terms have the following designations

Q = quantity of agricultural output
L = quantity of labor
C = quantity of capital
S = quantity of schooling
P = price of agricultural output
W^* = farm wage rate
W = nonfarm wage rate
R = factor for race
e = price elasticity of demand for agricultural products
$a_1 \ldots a_6$ and $b_1 \ldots b_6$ are constants to be estimated

The coefficients of the reduced forms of equations 10 and 11 measure the elasticity of labor and wages for education. The reduced forms are:

$$W^* = A_1 \, C^{A2} \, W^{A3} \, S^{A4} \, R^{A5} \qquad (5)$$

$$L = B_1 \, C^{B2} \, W^{B3} \, S^{B4} \, R^{B5} \qquad (6)$$

and the coefficients A_4 and B_4 indicate the responsiveness of wages W^*, and labor L, to changes in schooling, S; respectively. These are the coefficients of interest in this study. A_4 was estimated to be about 0.55 and B_4 about -0.70.

The interpretation of these figures is as follows. $A_4 = 0.55$ indicates that, for a 10 percent change in the amount of schooling giving members of the farm work force, there will be an increase of about 5.5 percent in wages. Simultaneously, from the fact that $B_4 = -0.70$, farm labor will decrease by 7 percent. In other words an increase in the amount of education results in both migration from the farm and an increase in wages for those who remain.

The magnitude of these numbers provides a basis for assessing the profitability of education on a rather broad basis. The data used in deriving these numbers was national data from the United States Census of 1950 and 1960. Schooling was measured as years of schooling completed.

In 1964 the median number of years of schooling completed by all farm workers was about 8.5 years. To raise this by a year to 9.5 years would involve an effective increase of 11.8 percent. This would have the effect of causing an 8.25 percent reduction in the farm labor force while at the same time increasing the farm wage rate level by 6.5 percent, all calculations being based for the estimated parameters for A_4 and B_4 reported above. These percentage changes allow estimates of costs and returns to be made. Using data for 1964 we find that the average farm wage rate per week was \$49.50. 6.5 percent of this is \$3.22 and assuming year round employment, for 52 weeks this represents a net gain of \$164 per year. From this figure it would appear that any education of the type which would raise the median level of education of all farm workers by 1 year and which cost less than \$164 per student per year would be profitable. In 1964 the average total expenditure on agricultural vocational education per student was \$89.60 indicating that this type of expenditure more than paid its way at that time.

For future planning, several points about this type of analysis should be noted. First it is very general. It applies only to the United States in total. Regional and state duplications of the methodology and in results are desirable for detailed planning. This kind of analysis is expensive and has not been undertaken in this study.

Second, the analysis conducted used average, not marginal costs. With decreasing numbers of people needed in agriculture per student margainal costs will almost certainly increase in the future. This may, however, be offset by the smaller numbers of people remaining in agriculture; a fact which means it will be easier to raise the median level of education.

Finally, education in agriculture alone will not be sufficient. Some people must leave agriculture in order that the gains to be effective. This will mean providing at least some education for nonfarm employment. This should almost certainly be in the area of general education rather than for agribusiness in light of the conclusions about this area stated elsewhere in this report.

6. Other Findings

The inverse of outmigration is entry and is natural to ask whether, given the necessity for outmigration at the levels projected in table 6 there will be any need for new entrants to agribusiness in the future. The answer to this question has been obtained by considering the age structure of farm employees and managers.

a. Farm Operators

Family farm labor includes (by definition), farm operators and unpaid family labor. In 1965 farm operators represented 80 percent of family labor employment, on the basis of one operator per farm calculations for 1980 suggest an equivalent value of about 76 percent for that time. Farm operators can thus be considered the major element of family farm labor both now and in the future. Further, since most of the remainder of family farm labor only exists by virtue of the head of the household's commitment to agriculture (as a farm operator), it is probably sufficient to consider only farm operators in planning for the family farm labor force of the future.

On the basis of the one operator per farm, there will be a need for 1,980,000 farm operators in 1980. Cohert analysis gives the through-time distribution of these requirements. Calculations for the estimation of these requirements have been based on maintaining the age distribution of commercial farm operators reported in the 1964 census of Agriculture (9 p. 612) into the future.

Additional farm operators will be required in the year age groups under 25 years, 25-34 and 35-44, through 1980. This requirement of new entrants reflects the older age of which operators commence farming on their own account. Requirements of entrants have been calculated for three five-year periods, 1965-70, 1970-75 , 1975-80. Total replacement operator requirements for these periods are shown in table 13.

The numbers in table 13 reflect the decreasing need for farm operators through 1980. In total 467,000 new farm operators will be required during the fifteen years 1965-1980. However, more will be needed in the first five years than the last five years. As well, the greatest demand in all three periods will be in the 35-44 age group.

Table 13. Numbers of replacement farm operatiors required to maintain 1964 age distribution of farm operators through 1980.

Age Group (yrs)	1966-1970	1971-1975	1976-1980
Less than 25	54,300	45,400	37,600
25-34	58,600	46,100	36,600
35-44	81,300	60,700	47,300
Total	194,200	152,200	121,500

When these five year totals are reduced to annual requirements, calculations to estimate the annual requirement of operators in each region can be made. This is done by distributing the total requirement across the regions on the basis of the projected requirements for family labor at the end of each five year period. The results are shown in table 14.

Several points need to be made about the contents of this table. First, the numbers in the table represent the effective replacement rates required. In order to achieve these replacement rates it may in fact be necessary to plan for a greater number of real replacements and some "fallout" as some operators fail to attain mastery of the operator role.

Second, all the calculations leading to table 14 are based on one operator per farm for all farms. Thus, the estimates given in the table include allowances for small farm operators as well as for the operators of large farms. By definition, "all farms" includes farms of ten acres or more, and farms of less than ten acres, provided the value of products produced exceeded $250.[1/] From the point of view of educating people to be operators of farms in the future, this may not be the most useful estimate to use. Better perhaps is the number of commercial farms.

A commercial farm has been defined as a farm having a product sales of $2,500 or more ($50 or more if the operator was under 65 years old and did not work off the farm more than 100 days per year).[1/] There were only 2,165,712 farms in 1964 in this category. This number represented about 70 percent of all farms in that year. Further, in looking to the future it would appear than not only should consideration of non-commercial farms be eliminated but perhaps also all farms having less than $10,000 value of sales. To obtain and educate a man to operate a farm of any smaller size in 1980 is probably to risk under employment of his final capacity.

In 1964, the number of farms in the category having $10,000 or more of sales, was 868,908; 27.5 percent of all farms. This number is growing. In 1950, only 9 percent of all farms fell into this category. By 1980 extension of existing trends, suggests that 70 percent of all farms will have sales over $10,000. For the intermediate years 1970 and 1975 comparable percentages are 37.2 and 50.7 percent). These figures mean that it will be increasingly important to train operators to manage large operations.

Thirdly, all the calculations made in providing the information for tables 13 and 14 assume the same age distribution among farm operators in 1980 as was reported for 1964. This is contrary to recent experience which shows that the average age of operators has been increasing. In 1945 the average age of operators was 48.7 years

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[1/] 1964 Census of Agriculture definition.

Table 14. Annual farm operator, replacement rates required to maintain the 1964 farm operator age distribution through 1980, by regions.

Region	1965-1970	1971-1975	1976-1980
Northeast	3,146	2,496	2,023
Lake States	5,150	4,067	3,246
Corn Belt	8,300	6,539	5,205
Northern Plains	3,399	2,782	2,333
Appalachian	6,459	4,919	3,842
Southeast	2,929	2,250	1,774
Delta	2,497	1,854	1,431
Southern Plains	2,859	2,246	1,815
Mountain	1,720	1,409	1,166
Pacific	2,377	1,869	1,443
Total	38,840	30,440	24,300

and in 1964 it had increased to 51.3 years. However such increases cannot go on forever, and for this reason an extension of the present (1964) distribution has been used. Any deviation from this assumption towards a higher average age will result in fewer entrants being required.

Fourth, the age distribution for new farm operators affected in table 13 is applicable with minor variations to the regional requirements of new operators; thus 28 percent of new operators in each region will be under 25 years of age, 30.2 percent will be 25-34 years old and 41.8 percent will be 35-44 years old. This means that for a sizable portion of the new entrants to farm operatorship there will be a substantial number of years for their training education and general experience. This situation contrast with the demands for hired farm labor where most of the entrants start in the 14-17 year old age group.

(b) Hired farm labor

The distribution of hired farm labor by age groups results in a very different pattern of demand for this class of labor. In 1966, 25 percent of all hired labor doing 25 or more days of farm work per year was aged 14-17 years. Twenty-two percent of hired labor was in the next age group 18-24 years. Consequently almost half the hired farm labor was under 25 years of age.

When the 1966 age distribution is applied to the 1970, 1975 and 1980 projected levels of hired farm employment, demands for new hired farm laborers, appear only in the age group 14-17 years. All other age groups take a net loss in order to get the demands for hired farm labor through 1980 are given in table 15.

It is possible that the 1966, hired farm labor age distribution may not prevail into the future. As farm size increases, an older more experienced and better trained class of hired labor may be necessary. However, it would take a substantial change in the distribution of ages of hired farm laborers before the demand for new hired farm workers will fall in a higher age group than the 14-17 year age group presently projected.

The age category of hired farm labor demands in the future has important implications for education. Of course, the most obvious is that, any full time training or education of hired farm laborers will have to be completed by age 17, and probably by age 16. Once in the labor force only part time or night school activities will be feasible. This suggests a need for concentrating all vocational training of hired farm workers in high school.

As in the case of farm operators, an annual intake greater than the net addition to the hired farm labor force may be necessary. This is to allow for dropouts. Accordingly plans should be made to

Table 15. Demands for new hired farm labor through 1980. (Annual rates of hired farm workers aged 14-17 years)

Region	1965-1970	1971-1975	1975-1980
Northeast	5,922	4,657	3,874
Lake States	4,306	3,637	3,187
Corn Belt	6,926	5,632	4,761
Northern Plains	2,833	2,430	2,198
Appalachian	11,481	9,756	8,376
Southeast	8,869	7,215	5,837
Delta	7,502	5,353	3,528
Southern Plains	6,342	4,605	2,995
Mountain	4,576	3,753	3,271
Pacific	12,421	10,945	10,018
Total U.S.	71,178	57,983	48,045

train more people to be hired farm workers than is suggested in table 15. Further, it may be desirable to include all farm workers in such training. This would include potential farm operators as well as hired farm labor. Farm operators could then move to additional training in post high school vocational training centers and colleges in order to continue and complete their training.

(c) Resource combinations

In order to get some idea of the resources which all classes of farm labor will be working with in 1980, an analysis of resource use trends has been made. The results are shown in table 16.

This table indicates a greater reliance of farms and farmers on other sectors of the community in the future. There will be more purchased inputs especially in the form of fertilizer and lime, feed, seeds and livestock and less reliance on land and machinery and labor. These indexes are national indexes, however, and do not reflect regional trends and quality differences. In the case of farm machinery these differences are important. Increases in the size of farms will mean more machinery per farm in spite of little change in the total investment in machinery for agriculture as a whole. Similar remarks can be made about the use of fertilizer and other purchased inputs. Per farm these will increase more than by the amounts indicated in table 16.

These trends indicate an increasing need for management skills in the form of future farmers. Farm operators will be working with a larger land base and larger machinery inputs and greatly increased amounts of purchased inputs. This will mean an increasing reliance on good money management in order for individual expansion to survive and prosper.

Table 16. Indexes of farm resource use (1957-59 = 100)

Resource	Actual 1965	Projected 1980	Percent Change 1965-1980
All Production Inputs	103	103	0.0
Non Burchased	86	45	-37.6
Purchased	113	148	+31.2
Labor	75	48	-36.0
Farm Real Estate	100	105	+ 5.0
Farm Machinery	101	105	+ 4.0
Fertilizer and Lime	163	366	+125.0
Feed, Seed, Livestock Purchases	124	173	+14.0
Misc.	124	175	+14.1

IV. DISCUSSION

It is clear from the results of the various analyses that large changes in the structure of U.S. agriculture can be anticipated through 1980. In particular, it can be noted that production patterns will change in the direction of more wheat and soybeans and less cotton and feed grains. Some of the regional effects of these changes are projected to be substantial. Changes in excess of 90 percent of 1965 levels of production are projected for soybeans and idle land in the Northeast region, for soybeans in the Northern Plains region, and for idle land in the Delta States and Pacific regions. Negative changes in all classes of agricultural production are projected for the Delta States.

Less labor will be required in agriculture than ever before. Estimates are for a 36 percent reduction from 1965 to 1980. This indicates that people must leave agriculture in spite of some expansion in wheat and soybean production. Regional differences in farm labor projections indicate that general policies are unlikely to be appropriate. Changes in labor demand vary widely between regions.

Capital use of farms is expected to continue at high rates. A national change of +38.3 percent is projected. This has two important implications for education. First operators must be trained to handle increasingly large financial transactions. Secondly, all men involved in agriculture will need increasing skills to handle the greatly increased amounts of physical capital each will be required to work with. Each man will be working with substantially higher ratios of land-to-labor, and capital-to-labor than ever before.

Farm size is expected to expand rapidly as smaller units become uneconomic and are absorbed into larger units. There will be fewer, by almost half, farms in 1980 and almost 75 percent of these will have sales of $10,000.

These projections would appear to have several implications.

First, in providing for the future of agriculture and the education of the people involved in it, it will be important to think "big." Curriculums, for farm operations for example, should specialize in training people for operations of 400 acres in size and $10,000 in sales as a minimum.

Secondly, as a consequence of the increased resource base per unit of labor greater skills in management will be necessary. With big increases in capital use, operator functions will more and more be management oriented. Knowledge of programming methods, optimizing procedures and management under uncertainty will be increasingly important. With capital becoming a very much larger proportion of all operations, attention to reliable and steady supplies of capital at minimum cost must be adequately attended to.

Hired labor will be increasingly concerned with technical issues. Most previously manual responsibilities can reasonably be expected to be superseded by mechanization in one form or another. The emphases will accordingly be on the skills required to operate and maintain the machinery involved.

The implications of these general changes in the structure of agriculture for education lie essentially in a process of extended consolidation. Fewer and fewer people will remain in the rural areas. For those who move, an education appropriate to an urban environment will be required. For those who stay a program of technical education at an increasingly high level will be necessary. For both groups the absolute number of schools and teachers must be expected to decrease. This process of consolidation must be expected to continue indefinitely.

The regional results of the farm labor projections suggest the areas in which the migration stress will be greatest. The Delta, Southern Plains and Southeast regions are the most critical of these areas. In these regions the need for development of educational programs to supply migrants with marketable nonfarm skills will be very high. Concurrently, the demand from workers entering the farm labor force will be for detailed knowledge and skills in operating and managing large operations with very heavy investments in machinery and other advanced technologies.

The data cited in the report is not sufficiently long range in nature to warrant specific recommendations on educational policy for training workers for non-farm agricultural occupations. However, several conclusions can be noted.

It appears non-farm agricultural occupations will be in the segment of the economy that is growing at a slower rate. Therefore, while there is no question that trained personnel will be needed, and in fact needed at a higher level of training than today, care should be taken in counseling someone to enter such a training program. The person should be advised of the growth characteristics of such occupations relative to the rest of the economy. Furthermore care should be taken that the training given should not make the person too specialized or inflexible in his acquired skill.

In training for non-farm occupations which require certain agricultural competencies it must be considered that, although the occuaptions have a common base, the over-all training needs may be quite diverse. For example, the occupations of livestock buyer and nurseryman both have been listed as occupations requiring agricultural competencies yet this may be the only common basis between the two occupations. In fact different agricultural competencies are needed. The question may then be asked about the orientation of the training. Is it an agricultural occupation which required business skills or a business occupation requiring agricultural competencies? In the first case the training should be basically agricultural with the student also taking a business course, in the latter case the proper orientation of the training might be business with an agriculture course supplementing it. In either case it could seem the training requirements for non-farm agricultural occupations would be too diverse for a one teacher or perhaps a one school district approach to providing training requirements.

The educational system in rural areas has been slow to accept the fact that many of their students will not be employed in agriculture. To the extent that this results in an education that does not allow the student to compete effectively with urban students for non-agricultural jobs, the educational system has short-changed the rural student and society by inadequate training. The rural educational system must become more responsive to the impact of social and economic change.

The brief evaluation given the profitability of vocational education would suggest that returns to this type of investment are still positive. However, this analysis has been of a very generalized nature and detailed impact studies of expenditure are needed before firm recommendations regarding the profitability of additional education in the area of vocational agriculture can be made. This is particularly important at the federal level as there is evidence of a "follow the leader" effect operating at the state and local levels.

In evaluating future trends, plans and expenditures for vocational agriculture, it will be increasingly important to keep in mind the declining scale on which all agricultural (and rural-for-urban) education will be operating on in the future. Continuous consolidation of all sources of rural education must be anticipated. This consolidation should be planned, as far as possible, to make efficient use of existing facilities while allowing for the phaseout of more and more smaller operations as time goes on.

Curricula for vocational agricultural education must become increasingly technical. It is apparent that both farm managers (operators) and hired farm workers will be working with greatly increased land-to-labor and capital-to-labor ratios. Both groups of people must be trained to adequately handle these larger amounts of resources. Farm managers must be taught at the level of $10,000 sales 400+ acre farms with appropriate management techniques. These should include linear programming analyses, an introduction to recursive and dynamic programming management games and training for dealing with uncertainty. Hired laborers in the future might well be denoted the technocrats of agriculture. Their work will be increasingly technical, involving large amounts of machinery and other investments, all of which hired labor should understand and know how to operate effectively and efficiently. Vocational agricultural programs should adequately reflect this fact.

Rural education would appear to need to be less agriculturally oriented in the future. Allowing for a generation gap of 30 years it would appear that there will only be opportunities in agriculture for about 1/4 to 1/3 of the offspring of present generation farmers, in the future. Thus 65-75 percent of all farm children face a propsect of movement to non-farm locations and their education in rural areas must take this fact into account if they are to become adequate self-supporting citizens in the future. Further, it appears that any assumption that this group tends to move specifically into agribusiness operations is at best tenuous.

The movement of people from rural to non-farm areas raises a very definite question about the funding of rural schools. In the section regarding the payoff to increased education above the payoff was measured against the effects on agriculture. However, taken in broader view, there is an additional effect arising from the movement of some people to non-farm locations. These people incur the expenses of education in rural areas and "payoff" in non-farm locations. This transfer from farm to non-farm locations is something for which most rural areas receive no compensation. This matter could rightly be the subject of further attention.

V. CONCLUSIONS

The results of this study would appear to warrent the following conslusions.

1. U.S. agriculture will undergo considerable changes in the period 1965 - 1980. These changes involve the relocation of production with differential effects occuring between crops and between different geographical regions of the U.S. These shifts in production can be expected to bring about changes in resource use which both directly and indirectly involve farm labor.

2. Farm labor use will decline substantially through 1980. Both hired and family labor will be affected. Each is expected to decline nationally by about 36 percent from 1965.

3. There will be regional differences in the decline of farm labor utilization. The largest declines are projected for the Delta States region and the least decline will occur in the Pacific region. There will be an absolute decline in the number of people required in agriculture in all regions through 1980.

4. Agribusiness employment represents only one alternative in many facing migrants from agriculture. It would thus appear that it would be better to offer a broadbased education to all rural people rather than to consider education of this group of people to be primarily of an agricultural orientation.

5. Agricultural education must increasingly become a training ground in management science. Management and orgaization is clearly the need of the future in agriculture.

6. Hired farm workers will increasingly require strong background and training in the technical issues of farming. These will

include the chemistry of fertilizers and herbicides, and the operation and maintenance of all types of machinery. Education must emphasize the fundamental issues involved in these and other technologies.

7. Planning of agricultural vocational education programs should be oriented to a continuous decline in the number of participants in these programs. Consolidation of facilities will also be a persistent need of this type of educational program in spite of the need to train some people for agribusiness employment in these programs.

8. Continuation of programs in vocational agricultural education would appear to be justified (at least in very broad terms) by considerations of their profitability. Such a conclusion is however tenuous. Decreasing numbers of people in these programs can quickly raise costs particularly if consolidation of facilities do occur at commensurate speed.

VI. SUMMARY

Six quantitative research methods have been used to evaluate the amounts and types of farm labor needed in the United States in the future. The year 1980 was arbitrarily chosen as a focal point for these investigations. The analyses have been conducted at various levels of aggregation, nationally and regionally. The various methodologies used include input output models, linear programming, time series analysis, production function analysis and other methods of general quantitative research.

The results of these analyses suggest considerable change in the structure of agriculture through 1980. This in turn has implications for agricultural education programs and suggests areas for change and additional attention.

Changing production and movement of production between locations within the U.S. forms the basis for the changes noted. Wheat and soybean production is expected to increase while feed grain and cotton production will decrease somewhat. Individual regional effects are significant. Accompanying these changes there will be an increase in capital use in all regions, and an absolute decrease in all types of farm labor used. Regional effects are important. An analysis of the patterns of demand for farm labor within different regions has shown that the biggest changes will occur in the Delta States region.

An analysis trade and employment in the agribusiness sector at the national has been made. Results reflect a trend towards automoation in the industry. Demand for services from this sector is increasing but total employment is not growing at a similar rate. Employment is growing at a slower rate than production. Further this rate is lower than that currently being experienced in other sectors of the economy.

Various aspects of past and present educational programs for rural people have been examined. Conclusions have been drawn from regarding these programs in the light of the information available about the future structure of agriculture. The most striking conclusion relates to the much higher ratios of land-to-labor and capital-to-labor anticipated in agriculture through 1980. These indicate that all classes of farm labor will have to be more technically skilled in order to be able to handle the types of management and operational problems associated with this more technical type of production in the future.

Finally the relative profitability of rural education has been examined. While the analysis suggests that this area is still a profitable avenue for investment, increasing costs per student may endanger this as the number of people involved in agriculture decreases. Consolidation of facilities for rural education would appear to be unavoidable under these circumstances.

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APPENDIX

Table A 1. Division of states into farm production regions

Region	States
Northeast	Main, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland, District of Columbia
Lake States	Michigan, Wisconsin, Minnestoa
Corn Belt	Ohio, Indiana, Illinois, Iowa, Missouri
Northern Plains	North Dakota, South Dakota, Nebraska, Kansas
Appalachia	Virginia, West Virginia, North Carolina, Kentucky, Tennessee
Southeast	South Carolina, Georgia, Florida, Alabama
Southern Plains	Oklahoma, Texas
Mountain	Montana, Idaho, Wyoming, Nevada, Utah, Colorado, Arizona, New Mexico
Pacific	Washington, Oregon, California

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PERSONAL AUTHOR(S)

Heady, E. O., Arcus, P. L. and Schluter, G. E.

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ABSTRACT

This project deals with the estimation of labor and manpower requirements in agriculture and related agribusiness fields in the United States. Changes in the structure of agriculture and their impact on rural education are evaluated.

The quantitative analysis is in six parts: (1) the development and application of a mathematical programming model which allows specification of 144 regions of agriculture, their products, the distribution of these and the resource use assocaited with this production; (2) the estimation, regionally and nationally, of the manpower requirements for different classes of workers and skills; (3) the estimation, regionally and nationally of the migration of labor from farms; (5) the application of production functions to the problems of evaluating investment in agricultural education; (6) and more general quantitative analysis using coefficients from general sources to convert the other estimates into manpower needs for different regions and labor classes and to project the total requirements for vocational and technical education in the future.

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THE POTENTIAL CONTRIBUTION OF PSYCHOLOGY TO INTERDISCIPLINARY RESEARCH IN VOCATIONAL-TECHNICAL EDUCATION

Project No. 6
Contract No. O. E. 5-85-108

Edwin C. Lewis
Mary Heiserman

May 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

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Ames, Iowa
50010

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	F-1
II.	METHOD	F-3
III.	RESULTS AND DISCUSSION	F-3
IV.	SUMMARY AND CONCLUSIONS	F-11
V.	REFERENCES	F-13

I. INTRODUCTION

A. Problem

The marriage of education and psychology has been an uncertain one. Initiated in the youth of both disciplines, its early success was stimulated largely by the efforts of Thorndike and Dewey. Much of the psychological research had direct relevance to educational problems, and educators were eager to seize the results of the psychologists and to extend them into classroom settings.

Gradually, however, psychologists became disenchanted with the vagaries of research on applied educational problems. As they grew more concerned with their responsibilities as scientists, they became increasingly aware of the drawbacks of applied educational research: lack of control of crucial variables, biased samples, dealing with questions which were not basically meaningful, etc. The result was that psychologists withdrew into their laboratories, limiting their work to areas in which the scientific method could be appropriately used, and insulted if asked to apply their results to real life learning situations. The educators in turn became discouraged with psychologists for their failure to deal directly with questions which seemed of basic importance to the educators. The outcome was predictable: the psychologists, engaged in fundamental research on human behavior, became estranged from the educators, charged with the responsibility of modifying human behavior in a vital setting. Such a situation could not indefinitely endure.

There is increasing evidence of late that the breach is healing. A new generation of psychologists has become aware of the importance of education and of the responsibility of psychology, as a scientific discipline, to provide whatever help it can to the enhancement of the educational process. Psychologists are becoming uncomfortably aware that they cannot continue to seclude themselves in their ivory towers; as part of society they share a responsibility for its improvement. Insofar as they can make a contribution to this improvement, they should do so, and they are.

Applications of psychological research to education are apparent in a wide range of areas, but the spread is quite uneven. For example, most psychologists work in academic settings, so it is hardly surprising that college students and the college setting have received a disproportionate amount of their efforts. And at the lower levels, psychologists have tended to be especially interested in the "psychologically exceptional" child--the gifted, the mentally retarded, the physically handicapped, etc. The average, normal child has been the least studied and probably the least understood.

Perhaps, though, the area of education most neglected by psychologists has been the area of vocational and technical education. To some extent, this is the fault of the educators themselves: with some exceptions, vocational and technical education has tended to be shunted aside into nooks and crannies peripheral to the more acceptable academic areas. But since the American public schools are committed to optimum educational experiences for all students, it has become increasingly evident that vocational and technical education must be considered a basic responsibility of the schools, if they are to meet the needs of a substantial segment of the population. This in turn means that greater concern must be given to the application of psychological research to the enhancement of vocational and technical education, which leads directly to the purpose and thesis of this study.

Once it is agreed that psychology can, and should, make a substantial contribution to the development and improvement of vocational and technical education, the next step is uncertain. "Psychology" covers a very wide area of research, and vocational and technical education can include a wide variety of activities. The problem is to determine at what points these areas intersect, both in terms of current knowledge and in terms of potential research efforts. That is the major purpose of this study: to locate those psychological studies which already have a current bearing on vocational and technical education, and to suggest areas of research which should be undertaken by psychologists which would have potential value for the development of vocational and technical education.

The original goal of this study was to provide a basis for the development of projects to be supported by a more extensive grant. This further grant, however, was not forthcoming due to budgetary limitations, so that this report represents only the initial phase of what was to have been a more extensive series of studies. One project was devised and executed as an outgrowth of this initial study, and others have been devised which will likely be carried out sometime in the future.

B. Objectives

1. To collect information concerning the current status of research and knowledge derived from the application of psychological principles and methodology to the study of educational problems.

2. To organize this information so as to provide guidance for persons engaged in vocational and technical education and to stimulate the development and execution of research projects to fill current gaps in knowledge.

3. To work closely with the members of the Iowa State University Department of Psychology, as well as with persons with related interests in other departments, to inform them as to current research needs in vocational and technical education to which psychologists might contribute, and to aid them in the development and execution of research proposals related to these needs.

II. METHOD

This study could not attempt to survey all possible interactions between psychological research and vocational education. Choices of areas to emphasize had to be made, and these choices can be questioned. Within these areas, however, we have attempted to make a reasonably thorough survey of the literature concerning previous research which might apply to vocational and technical education, although no such survey can claim to be all inclusive.

The survey concentrated primarily on the Psychological Abstracts as sources of research studies which might have bearing for vocational and technical education. An intensive survey of the Abstracts was made, covering the period 1930-1965. In addition, a less intensive survey of textbooks concerning methodology in psychological research was included, as well as research studies sponsored by the U.S. Department of Health, Education, and Welfare, which may not yet have been published. The investigators believe that this survey represents a reasonably adequate sampling of research efforts during the past thirty years which may have implications for the development of vocational and technical education.

In addition to the survey of the literature, the investigators discussed potential research projects with members of the Iowa State University Department of Psychology. The proposed projects presented here represent the views of these experts, especially in terms of the kinds of projects they would personally be interested in undertaking.

III. RESULTS AND DISCUSSION

A. Student Characteristics

Abilities. Abilities represent the raw material for learning, and any educational program must concern itself with the abilities of the students. Yet it is becoming increasingly clear that the development of abilities can be greatly influenced by the individual's environment. Therefore, any discussion of the abilities of students in relation to vocational and technical education must consider not only the abilities which they bring to the educational experience, but also the ways in which the development of these abilities can be modified.

A prime example of the role of environmental opportunities in the development of abilities is expressed in the relative advantage of urban over rural children on tests of mental ability. (see, e.g., Wilson and Ashbaugh, 1929; Bruce, 1940; and Armstrong, 1964). According to Egawa (1956), mental alertness seems to be the most distinguishing factor in differentiating between the two groups.

A number of factors have been suggested as contributing to these rural-urban differences in abilities. Perhaps there is a true difference, but because of other variations this is difficult to establish. One problem may be that the tests used to measure mental abilities are biased toward the urban group--e.g., contain items with which urban children would be more familiar. Motivation and interest may be an additional factor, as have been suggested by Lynch (1955) and by Ryans (1942). Elder (1963) found that rural young people tend to have fewer achievement opportunities, to have lower academic values and goals, and to have lower achievement motivation than their urban counterparts. Likewise, Sewell and Orenstein (1965) found that the proportion of students choosing "high-status" occupations increases as the size of the community increases. The conclusion is inescapable that much, if not all, of the inferiority of rural youth in ability tests can be attributed to motivation differences, perhaps a reflection of the way of life in rural America. If this is true, however, such differences can be expected to diminish as this gap closes.

Certainly the motivation element must be given high priority in attempts to modify the abilities of learners. The student who has grown up in an atmosphere in which learning is valued and in which intellectual stimulations are bountiful has a decided advantage over the child whose background is unstimulating and in which learning is rejected. Vocational and technical education programs will succeed to the extent that they can draw on abilities.

Most of the research on learning abilities has been concerned with abilities important in the typical academic setting. If, as Guilford (1959) has suggested, it is psychologically more sound to view abilities as multi-dimensional and multi-faceted rather than unitary, it is quite possible that research to this point has neglected those abilities of importance in vocational and technical education. Certainly basic learning ability is necessary, but the applications of this ability may come about through avenues not tapped by the typical ability tests. It may therefore be misleading to become discouraged about the abilities of students in vocational and technical education programs. More must be learned about the kinds of abilities required to profit from these programs, and tests must be designed to measure the relevant abilities. In addition, we must learn how these abilities develop and how they can be stimulated. Perhaps, as Vanhuysse (1957) has suggested, there is something like "technical intelligence." If so, it must be isolated and measured, and relationships between it and performance in vocational and technical education programs must be established.

The role of the community in the establishment of individual educational goals must be recognized and utilized. Areas in which educational achievements are not highly valued must be studied; perhaps the traditional educational achievement is not appropriate, but achievements in other areas may be. A vocational education program might be supported in such areas, if the community were made aware of the value of the program and the kinds of behaviors necessary for student success.

What sort of concepts are important in vocational and technical education, and how do these concepts develop? Current research on concept development has concentrated primarily on the development of concepts important in traditional academic programs. Perhaps somewhat different concepts are important in vocational and technical education. If so, these should be established, and the development of the relevant concepts should be studied.

Most of the current research on creativity has likewise been concentrated on the traditional academic areas. Little work has been done on creativity in vocational and technical areas; if education in these areas is to produce creative individuals, the nature of the creative process in these areas must be known.

Interests. An individual's achievement is largely the product of his ability and his interest in a given area. If students are to succeed in programs of vocational and technical education, the nature of interests in these areas must be well understood.

Students' interests have been found to be related to their vocational aspiration level (Stefflre, 1955b) as well as their school achievement (Frandsen, 1947), although interest in an occupational area does not necessarily indicate ability in that area (Kerr and Willis, 1966). Apparently interests may be stimulated by factors other than ability. Several studies (Motto, 1959; Samuelson, 1958; Long, 1959) have had only limited value in using interest inventories to predict success in vocational and technical programs, with correlations being higher for girls than for boys.

The lack of strong relationships between measured interests and vocational success is discouraging and suggests that the nature of interests in this respect is not yet well understood. The relationships among ability, achievement, and interests need to be more thoroughly explored, especially as they relate to success in vocational and technical education programs and in subsequent on-the-job performance.

One possibility is that interests may not only influence performance in such programs but may in turn be influenced by the program. It would therefore be desirable to investigate the influence of vocational training and work-study programs on the development of interests in vocational and technical occupations.

Level of aspiration. Educational and vocational plans reflect the level of aspiration of the planner. If students are to make optimum use of their abilities by obtaining appropriate education, attention must be paid to their aspirations, and how these develop.

The school itself seems to have a strong influence on the student's aspirations. Boyle (1966) has suggested that this influence operates through the type of school (whether academic or vocationally oriented), the educational standards, and the kind of peer groups likely to exist in a given type of school. Rosenfeld and Zander (1961) have also emphasized the importance of the teacher in influencing students' aspiration, especially if the teacher employs rewards rather than coercion to reinforce his views. They also report that although teacher disapproval of inadequate performance has little effect, teacher disapproval of adequate performance has a negative effect. Teachers can also exert a strong influence on aspiration level through their expectations that certain children will perform at a certain level (Rosenthal and Jacobson, 1966) and by acting as a model in the development of student's concepts of occupational roles (Day, 1966). An experimental study of this theory has been presented by Heiserman (1967).

The influence of past experience on level of aspiration in academic settings has been established by Byers (1962), although past experience becomes less important as the student gains experience with the current task. This suggests that students should be encouraged to gain experience in a new area before attempting to set goals for themselves; otherwise the student who has previously been unsuccessful will tend to set unrealistic goals and thereby not profit from the new experience. As Hilgard (1942) has suggested, it is the teacher's responsibility to help the student set realistic and attainable goals and to reduce social pressure on the less successful student.

The student's level of aspiration is also strongly influenced by personality characteristics of the student himself.

One of these is his need for achievement, which plays an important role in goal setting and in subsequent performance. Under achievement-oriented conditions, greater discrepancies are likely to occur between performance goal and performance than under relaxed conditions (Feather, 1958). Research by Tureck and Howell (1959) suggests that the proportion of ratio of success to failure experiences influences the strength of the achievement need. Feather (1965) also found that expectation of success prior to performance is positively related to strength of the achievement need, providing that opportunity for accomplishment is present. According to Moulton, (1965), instructions intended to reduce the degree of underestimation of the probability of success increase low levels of aspiration. Apparently, level of aspiration (as defined by achievement need) can be modified by the relative frequency of success and failure experiences for a given individual, although it is difficult to exert complete control over this.

Many more studies could be cited which confirm the relationship between success and failure experiences and subsequent level of aspirations (e.g., Schroder and Hunt, 1957; Mahone, 1959, 1960; Lowe, 1959; Amin, 1951; Lichtenberg, 1957; Lachman, 1961; Mohr, 1952; Muthayya, 1962; and Fruchter, 1952). Inasmuch as students most likely to be candidates for vocational and technical education programs are less likely than others to have experienced success in the typical academic program, the effects of their previous failure experiences in educational settings must be understood if they are to be helped to set realistic goals in the new setting.

Level of aspiration is also related to the social class background of the student. Jahada (1953) has demonstrated that students from lower social classes tend to over-estimate occupational aspiration level more than do other students. Intelligence, however, is also a factor, as the more intelligent lower-class students tend to set higher occupational goals than do those who are less intelligent (Seidman, 1954; Stefflre, 1955a; Empey, 1956). Weiner and Murray (1963) have reported that lower-class parents now set higher educational goals for their children than was formerly the case, which suggests that resistance of lower-class families against educational advancement of their children may be weakening.

Differences between urban and rural youth are also evident in occupational aspirations, with urban youth generally indicating higher levels of aspiration (Bennett and Gist, 1964; Hodgkins and Parr, 1965; Haller, 1958, 1960; Haller and Sewell, 1957; Morland, 1960; and Grigg and Middleton, 1960). This difference, however, seems to lie more in educational than in occupational aspirations, leading Haller (1960) to suggest that rural youth seem to underestimate the importance of education in achieving their desired occupations.

A few studies have dealt with possible differences between whites and Negroes in aspiration level (Holloway and Berreman, 1959; Smith, 1961), but no significant differences have been located when social class level has been controlled.

Numerous studies have been concerned with the relationship between student personality and adjustment and occupational aspiration, but the results have been inconclusive (Sewell et al., 1953; Schutz and Blocker, 1961; Ryan, 1954; Dynes, Clark, and Dinitz, 1956). There is some suggestion that high aspiration may be associated with dissatisfaction with oneself, but whether such aspirations can realistically act as actual motivators is uncertain.

We may conclude that aspiration level is a malleable quality and that attention should be paid to the development of appropriate levels among students. This may be an especially crucial variable among students in vocational and technical education programs, inasmuch as (1) their previous academic experiences may not have been very successful; and (2) this setting may represent a new experience in which it is difficult for them to set realistic goals. Teachers in vocational and technical education should pay particular attention to helping their students set realistic goals and to evaluate their performance in relation to these goals.

Most research on aspiration level in academic achievement has dealt with traditional academic courses. The proposed study would investigate the nature of aspiration level in vocational and technical education, and the relationship between level of aspiration and actual performance. Variables such as prior success and failure experiences, student ability and personality characteristics, etc., would be included in the study.

B. Academic Achievement

Several studies (Matsumoto, 1959; Barr, 1959) have found higher academic achievement among urban children as compared with rural children, but Willey and Stablein (1963) failed to confirm this. Perhaps more important than community size itself is the attitudes of the community relative to education. Schutz (1960) located five factors from an analysis of interactions between community and educational achievement measures: urban-financial, intellectual climate, economic stability, academic achievement, and socioeconomic status. Whether similar factors would be found in relation to vocational and technical education should be determined.

Student achievement is also a function of student personality characteristics and the reactions of teachers to these characteristics (Ames, 1943; Battle, 1957), and the student's academic self-concept also has an important bearing on his academic performance (Payne and Farquhar, 1962). In both areas, research is needed as to their importance in achievement in vocational and technical education.

School failure and dropouts. The problem of maintaining students in an educational program is more directly related to vocational and technical education, inasmuch as such programs are often alternatives to a withdrawal from formal education.

A variety of influences contribute to school dropouts, among these being low intelligence, personality maladjustment, social class, inappropriate academic programs, and lack of direction on the part of the student (Cook, 1956; Lodato and Zweibelson, 1965; Littlefield, 1966; Wilson and Buck, 1960).

Two approaches which have been proposed for dealing with the dropout problem are work-study programs and increased counseling with potential dropouts (Littlefield, 1966; Taber, 1963; Freedman, 1963; Lodato and Zweibelson, 1965). A combination of both approaches is probably most desirable, since short-term programs aimed simply at reducing dropouts have not been successful. Related to this aspect is a study by Camp (1966) of a special course aimed at improving the students' academic self-concept and attitudes toward school, by concentrating on preparation for job placement through vocational guidance information and study of local job opportunities in a non-threatening, student-centered atmosphere. The results of this approach suggest it could be applied to vocational and technical education programs quite successfully.

One factor contributing to drop-outs may be the lack of appropriate models in the typical academic setting for students who are not academically oriented. Most adults in academic settings have a strong commitment to academic values, and therefore may not be able to act as behavior models for students who do not share these values. Vocational and technical education programs should be able to overcome this problem by including as instructors persons who are less strongly identified with academic education and more identified with industry. Much of this, however, is speculation. A research study could be designed to provide evidence pertaining to this notion, namely, to determine the kinds of adults who would provide the most appropriate and helpful models for non-academically oriented students, both male and female, and to determine the kinds

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of settings in which this influence could best operate. Since it is likely that the useful models would differ between males and females, separate studies would be necessary.

C. Counseling and Guidance

The value of counseling and guidance programs is difficult to establish, primarily due to inability to specify definite criteria of outcome. Research by Rothney (1958) and by Jenson (1955) indicates that expanded programs of counseling and guidance are potentially helpful to students in vocational and technical education, but more sophisticated research is needed to determine which aspects are helpful and in what ways such programs influence students. It seems likely that the sheer amount of attention given students through such programs is a major factor in their success; this is probably desirable, but should be known.

Group procedures have recently become popular in guidance programs (see, e.g., Warters, 1951) but their value in vocational and technical education programs has not yet been explored.

Students in vocational and technical education programs would seem to be especially in need of counseling regarding their vocational plans, inasmuch as such programs are strongly vocationally oriented. Students often make vocational decisions with little knowledge about the occupations they are considering (Jordaan, 1955); this process should be studied more extensively and the results applied to vocational and technical education. A large amount of current research deals with vocational development, but little of it has focused directly on occupations closely associated with vocational and technical education. Vocational choice has been found to be related to social class (Swift, 1966; Youmans, 1956), family background (Jensen and Krichner, 1955), size of community (Sewell and Orenstein, 1965), and level of aspiration (Arnstein, 1956). Jensen and Krichner (1955) have found that sons tend to follow the occupations of their fathers and, when they do not, they usually advance up the occupational ladder. The operation of these various factors must be understood in relation to choices of occupations associated with vocational and technical education.

One possible aid for students in the development of appropriate vocational choices lies in teaching about occupations. Although such information is badly needed, its value depends on the manner in which it is presented, in relation to the developmental stage of the students. A study by Sinick, Gorman, and Hoppock (1966) suggests that early presentation of occupational information may aid the student in developing an understanding of occupational concepts, identifying vocational interests, developing a more realistic self-concept, and promoting readiness for vocational choice. They also suggest that early presentation of occupational information may reach the potential school dropout and thus perhaps reduce the dropout rate, or at least help the dropout before he gets away.

Ideally, vocational choices should be related to manpower needs, especially in areas in which vocational and technical education is primarily concerned. Since programs in these areas are job-oriented, the student should have good knowledge of the manpower needs in his area of choice. This is one of the major functions of occupational information, but it is evident that in many cases vocational decisions are made in ignorance of such data. The research proposed here would concentrate on procedures by which this manpower information could be communicated to students in vocational and technical education programs, and the ways in which this information is used. Related to this would be consideration of the motivation to use manpower information by students in vocational and technical education programs, as compared with students in other kinds of educational programs. Finally, study would be made of the perception of students of various kinds of vocational and technical occupations and of ways by which these perceptions could be modified.

D. Testing

Tests are popular tools for assessment and prediction of performance in a wide variety of educational undertakings, although the extent of their use often outruns their known validities in a given situation. The use of test data in vocational and technical education programs has not been extensively studied, and research in this area is needed if test data are to be meaningfully utilized. Traxler (1966) has reported on the usefulness of the General Aptitude Test Battery in predicting success in a vocational-technical high school and concluded that this test could be helpful in counseling and placement of students, especially in manual arts and stenographic curricula.

Most educational tests have been designed to predict success in traditional academic programs. If vocational and technical education programs are to effectively meet the needs of students, tests are needed to measure the kinds of abilities required to perform well in these programs. This may involve the re-standardization or modification of existing tests, or perhaps the development of new tests. In any case, however, an extensive research program is needed to develop measuring instruments of special value for use in programs of vocational and technical education.

IV. SUMMARY AND CONCLUSIONS

The purpose of this study was to locate psychological research which had implications for vocational and technical education and to identify gaps in knowledge in this area which psychologists could help fill. This was accomplished first by a thorough survey of the published literature concerning the application of psychological principles to the study of educational problems, and secondly by discussions with members of the Department of Psychology at Iowa State University to determine how their research interests might relate to this problem. Numerous potential studies were identified and suggested in the report.

It can be concluded that, although psychologists have already made important contributions to the understanding and furthering of education, much of this contribution is only of peripheral value for vocational and technical education, especially in nonmetropolitan areas. The research projects sketched in this report should add to knowledge in this area and should thereby help to continue to decrease the gap between psychology and education.

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Lewis, Edwin C., Heiserman, Mary

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ABSTRACT

This research dealt with the potential contribution of psychology to inter-disciplinary research in vocational-technical education. A thorough survey was made of the psychological literature to determine knowledge already gained through research which might be applicable to vocational-technical education as well as gaps in the knowledge which psychological research could fill. Discussions with staff members of the Iowa State University Department of Psychology located specific areas of relevant research interest which they were prepared to develop and produced some tentative research designs for further consideration.

In general, the results indicated that a substantial amount is known relative to student characteristics and their interaction with the educational process which have important relevance for vocational-technical education, but that the influence of more subtle psychological processes on the motivation and performance of such students has not been well explored. In particular, certain models, derived from other areas of psychological research, were described which show promise for increasing our understanding of the educational process in vocational and technical education settings. Numerous areas for further research were delineated, especially with regard to increasing understanding of education in non-metropolitan areas, the focus of the overall project.

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AN ANALYSIS OF LEGAL AND POLITICAL PROBLEMS AND THE STRATEGY NECESSARY FOR IMPLEMENTING PROGRAMS UNDER THE VOCATIONAL EDUCATION ACT OF 1963

Project No. 7
Contract No. O. E. 5-85-108

Donald E. Boles

June 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U. S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Iowa State University of Science and Technology

Ames, Iowa
50010

TABLE OF CONTENTS

Page

I. INTRODUCTION G-1
  A. Problem G-1
  B. Objectives G-4

II. METHOD G-4

III. RESULTS G-10

IV. DISCUSSION G-12
  A. Questionnaire Results And Evaluations G-12
  B. Wisconsin G-29
  C. Louisiana G-36
  D. Montana G-40

V. CONCLUSIONS AND IMPLICATIONS G-48

VI. SUMMARY G-49

VII. REFERENCES G-53

I. INTRODUCTION

In the process of introducing vocational education and training adequate for individual fulfillment within the national society and in providing opportunities for citizens who wish to work in or near their home community, substantial modifications will occur in social, economic and govermental institutions.

There is considerable literature in the social sciences that seeks to analyse rural community structure and the process of change in smaller cities and rural communities. But one little-noticed problem plaguing school administrators and policymakers results from confused rural perception. This is not to suggest that school men are the only profession afflicted by myopia in perceiving an image of their role. There is, however, evidence to suggest that this problem has hindered sincere school administrators and planners more in achieving their goal than has been the case with most professions in our society. The unfortunate result is that not only are they frustrated by failures growing out of this confusion but so is the enlightened public.

At the heart of this difficulty is a frequently mistaken notion held by school officials both academic and vocational that their position apparently forces them into a schizophrenic stance by what they regard as "the system". They lament that one moment they are expected to be professional and must so operate in whatever area they are engaged; on the other hand to obtain the necessary buildings, salaries, teaching tools and favorable public opinion they must operate in the political arena of interest groups, parties, and pressure politics. This, they feel, for some reasons taints them.

A. Problem

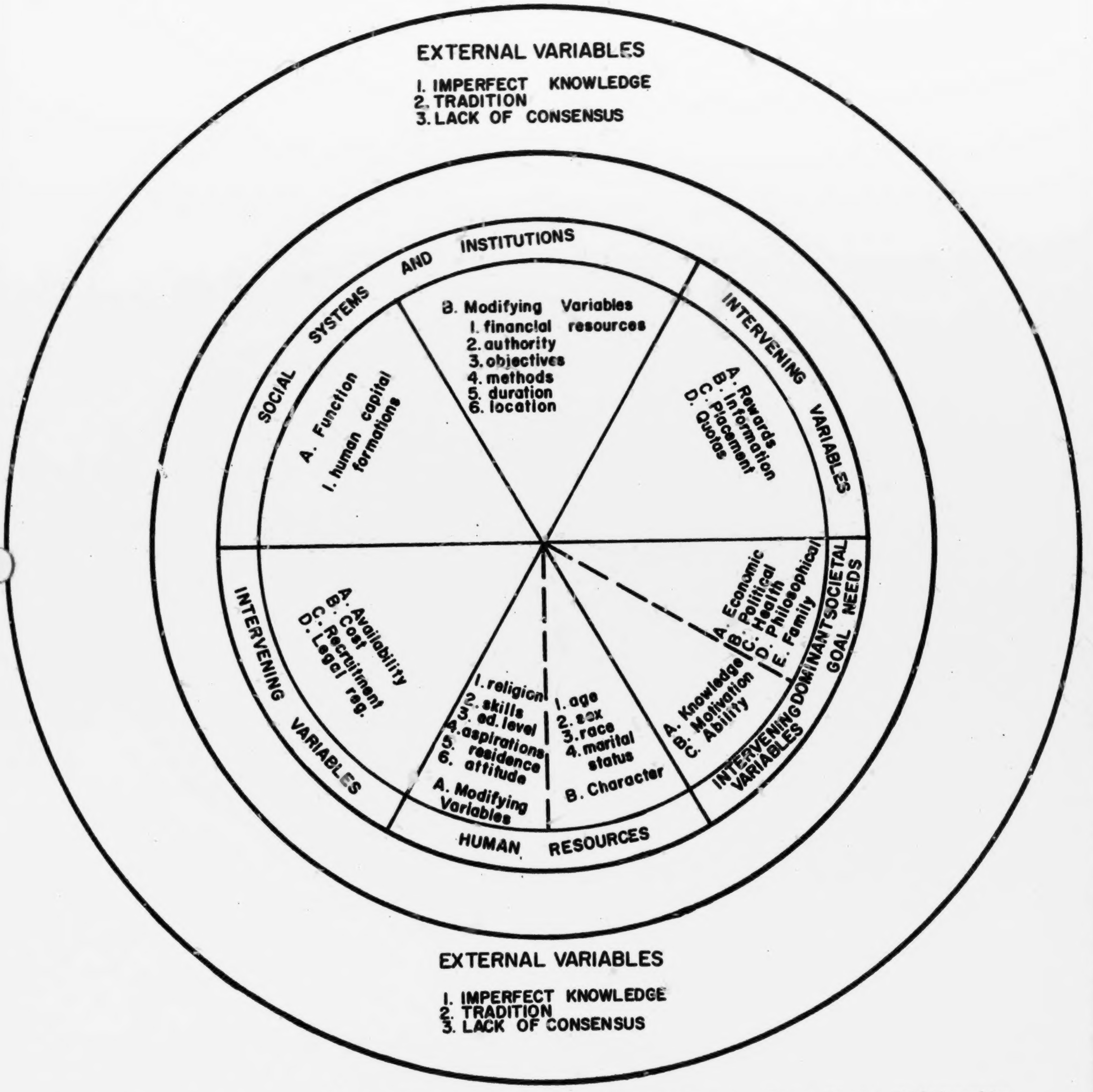
As is pointed out in the earlier report, decision making in the field of education requires a sharp-eyed awareness to the systemic quality of the processes developing and controling a governmental function.

To be most useful to the decision-makers of vocational educational policy, systemic research was directed to such questions as how governmental resources are allocated and the manner in which they are. Given the national legislative goal of expanding vocational education, national policymakers particularly wish to know and understand elements inhibiting and encouraging the development of vocational programs locally to maximize support for vocational educational programs.

But as earlier noted the irritation caused by the ambivalence of attitudes on the part of school administrators and policymakers can only be because of their concern as to whether they are in fact administrators and can only be destroyed when they see themselves for what they are -- governmental officials who work within the regular processes of government and politics. Public school officials are in error if they equate their brand of professionalism with that of the lawyer or the medical doctor. In essence, their constituencies are different. The latter professions operate essentially within the private sector, although with growth of such governmental programs as Medicare, and with the Supreme Court decisions requiring effective counsel in most criminal cases, there maybe a tendency to see the medical and legal professions' traditional private quality as changing. Public school professionals especially vocational school directors, on the other hand, are by the nature of their profession operating in the public or governmental sector. This, of course, does not make them any less professional. Their's is merely a different brand of professionalism. A highly trained governmental economist, a statistician or a professionally trained administrator, who might, for example, hold a Ph. D in political science, would not feel himself professionally soiled because he was required to operate within the processes of government and politics. This, after all, is the life blood of his professional activity. Insofar as public school administrators and policymakers are concerned, however, and this includes vocational school administrators, this feeling of involvement in the processes of government tends to remain foreign.

In essence then, one of the primary concerns of

FIGURE I: EXPLORATORY MODEL FOR ANALYZING AN EDUCATIONAL SYSTEM


EXTERNAL VARIABLES
1. IMPERFECT KNOWLEDGE
2. TRADITION
3. LACK OF CONSENSUS
SOCIAL SYSTEMS AND INSTITUTIONS
A. Function
1. human capital formations
B. Modifying Variables
1. financial resources
2. authority
3. objectives
4. methods
5. duration
6. location
INTERVENING VARIABLES
A. Rewards
B. Information
C. Placement
D. Quotas
DOMINANT SOCIETAL GOAL NEEDS
A. Economic
B. Political
C. Health
D. Philosophical
E. Family
INTERVENING VARIABLES
A. Knowledge
B. Motivation
C. Ability
HUMAN RESOURCES
1. age
2. sex
3. race
4. marital status
B. Character
1. religion
2. skills
3. ed. level
4. aspirations
5. residence
6. attitude
A. Modifying Variables
INTERVENING VARIABLES
A. Availability
B. Cost
C. Recruitment
D. Legal reg.
EXTERNAL VARIABLES
1. IMPERFECT KNOWLEDGE
2. TRADITION
3. LACK OF CONSENSUS

Prepared by Donald E. Boles, Professor of Government, Iowa State University, Ames, Iowa. February 15, 1968.

this study was to attempt to evaluate and analyze the system in which vocational education operates thereby affecting and being affected by the overall political, economic, and social constraints of American Society.

B. Objectives

During the course of this study, research was directed toward the following questions.

1. What was the overall systemic nature in which any vocational school system must function within the local, state and national governmental framework?
2. What are the present laws in the administrative arrangement governing vocational educational programs?
3. What are the principal aspects of existing programs---leadership, organization, procedure, financing---and how do these differ among key states?
4. What environmental and interest group factors have acted or are acting upon state legislatures to control these decisions in these areas?
5. In what ways have these forces influenced their states' vocational policies as prescribed by the state legislatures and administrative agencies in the form of laws, regulations, and overall policy?
6. In what ways do these factors account for the variations between states' indecision regarding vocational programs?
7. In what ways can conditions influencing vocational education policy outputs be altered to meet national legislative goals? (See Figure I)

II. METHOD

As was pointed out in the previous report, answers as to how any government allocates its limited resources with respect to education were obtained by consulting state statutes, administrative rules, budgets and official decision-makers. Answers as to why resources are allocated were assimilated by examining those factors, such as available revenues, and forces, such as interest groups pressures which had an impact upon authoritative decisions. Also a study was attempted of the ways that environmental or situational factors, such as levels of community income, community mores and existing institutional or legal arrangements, limit possible courses of action of the governmental decision-makers.

Of the basically non-metropolitan states studied, four were chosen as having sizeable rural populations. These were: Iowa, Wisconsin, Louisiana and Montana. Out of the eighteen states which met the basic census criteria, the four just mentioned were selected because they differed in important respects, particularly the types of existing vocational programs, or in the degree to which they had obligated themselves financially to vocational education. In approaching the analysis of the states of Iowa, Wisconsin, Louisiana and Montana, the initial institutional focus was upon state law and legislative process which assumed that the legislatures are to some degree central and instrumental in shaping the vocational educational policies of the state. Nonetheless, it is important to recognize that administrative agencies such as state boards of public instruction and state vocational educational boards frequently can, through direct and indirect means, alter, develop, and affect educational policy in the field of vocational education.

To put it somewhat differently, there are various ways of looking at a governmental function such as vocational education. One may observe the constitutions and the laws governing and establishing such a system. Second, one may look at the way in which such governmental function is, in fact, administered. This may or may not correspond to the intent and the spirit of the constitution and the laws. Three, one may look at the overall political, economic, and social system in which a particular function operates to see how, in fact, the governmental function is effected by, and affects, the overall system. Methodologically speaking, these are facts which have generally been ignored concerning the governmental functions of education and, more specifically, vocational education. If this interrelatedness was studied at all, it was viewed at best on a haphazard basis until recently. In an attempt to develop a systemic methodological overview for purposes of visualizing this essential interrelationship, and to encourage further conceptualization regarding the fundamental relationship, the following model, Figure I, is offered as a starting point. It should be emphasized that there is absolutely no intent to suggest that it is a finished product or, for that matter, that it is completely adequate. Some analyst may instantly observe areas where refinements could and should be made. But as Thomas S. Kuhn has so aptly explained, in his work The Structure of Scientific Revolutions, "What a man sees depends both upon what he looks at and also upon what his previous visual conceptual experience has taught him to see."[5]

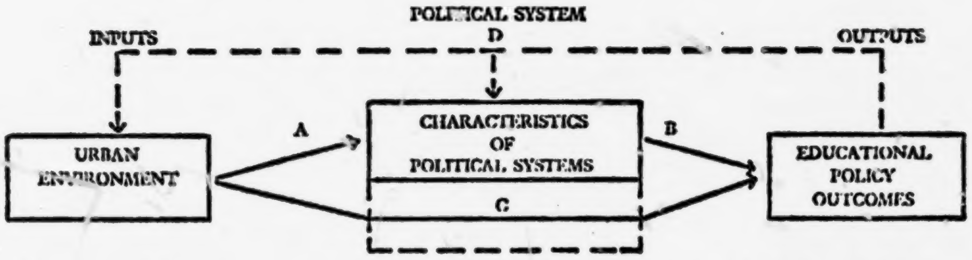
It should be emphasized again that throughout this study an attempt was made to establish and utilize a systemic analysis of vocational educational programs as they operate within the total context of the community. Therefore, from the standpoint of methodology, it was taken as elemental that policy outcomes in education expressed significant value commitments of the community. In statistical terms such commitments might be viewed as dependent variables which political scientists should be expected to explain, since the study of matters of public policy and political values are matters of basic concern to the discipline. In a study recently completed, Thomas R. Dye of the University of Georgia has done this for 67 large cities in the United States using variation of a model devised earlier by David Easton.[3]

The use of Easton's model aids in conceptualizing the determinants of educational outcomes in the nation's cities.[4] Educational outcome may be conceived of as products of "inputs" brought to bear upon a "system which causes it to produce specific 'outputs'".

The real value of the Easton model is found in

FIGURE II

A Model for the Analysis of Educational Policy Outcomes in American Cities


POLITICAL SYSTEM
INPUTS
D
OUTPUTS
A
B
URBAN ENVIRONMENT
CHARACTERISTICS OF POLITICAL SYSTEMS
C
EDUCATIONAL POLICY OUTCOMES

selected variables:
- size
- adult education
- occupation
- income
- race
- value of property

selected variables:
- school board selection
- school board representation
- assessor selection
- city control over schools
- form of city government
- type of ballot

selected variables:
- pupil expenditures
- school tax rates
- local school support
- teacher preparation
- teacher salaries
- teacher pupil ratio
- teacher turnover
- drop-outs
- private enrollment

the question it poses. As Dye invisions it they are:

1. What are significant dimensions of educational inputs, school systems and educational outputs?
2. How do environmental inputs affect educational system structures?
3. How do environmental inputs affect educational policy outcomes?
4. How do structural variables affect educational outcomes?
5. How do educational outputs affect through feedback system characteristics and inputs?

As has this researcher, T. R. Dye has attempted to devise a model designed to aid in the analysis of policy outcomes in American cities. While the two models differ in the graphic presentation it would appear there is notable similiarity in many of their substantive features. Figure II reveals Dye's approach to the matter.

The basic question that is highlighted by use of this and similiar approaches is a critical one to all policymakers. That is, do structural variables in educational politics independently influence educational outcomes, or are these outcomes determined by environmental variables regardless of structural variables? To put this somewhat differently, if we assume environmental variables influence both the structure of a community's politics and also its educational outcomes, can structural variables be demonstrated to influence educational outcomes once the effects of the environmental variables are controlled? Dye's approach to the utilization of the Easton model is an attempt to assess the impact of the structure of city government in the structure of the public school system upon educational outcomes. One might conceptualize it to apply as well to vocational schools specifically. In addition, a comparison was made of the effects of these structural variables on educational outcomes with the effect upon urban environmental variables. Some of the questions raised were:

1. Is there any major difference in educational

outcomes in the case where the school board is elected or where it is appointed?

2. Are the outcomes different if school board members are elected at large or if they are elected by ward?
3. Does the fact that the tax assessors are elected or if they are appointed significantly affect school taxes or expenditures?
4. Does it make any difference in educational policy if city elections are legally partisan or non-partisan?
5. Does it make any difference if a city has a mayor or a city manager or commission form of government?

On the other hand, the study sought to determine if educational outcomes are primarily a function of the economic character of the city; for example, it's size and wealth, it's educational and occupational level, it's income and it's racial composition.

Using the methodological technique of multiple correlation coefficients, Dye attempted to summarize the effects of six environmental variables and six structural variables upon educational policy outcomes in 67 American cities. The environmental factors utilized in the study were: size, education, occupation, income, race and property. The structural variables consist of method of school board election, school board representation, method of selection of assessors, physical independence of school boards and the type of election ballot and form of ballot.

While recognizing the dangers of assessing significance to a multiple coefficient, Dye points out that the coefficients he used indicates that neither environmental or structural variables are able to explain all of the policy differences among cities. Moreover, he explains that the study was unable to produce much evidence of a strong explanatory linkage between political system characteristics and educational outcome. On the other hand, urban environmental forces such as size, wealth, socio-economic attributes of the population, for example, appeared to directly influence educational outcomes without being mediated by structural variables. Indeed, in only two policy outcomes, teacher-pupil ratio and teachers without degrees were structural characteristics of the political system more influential than the environmental variables previously referred to.

He concludes this study, however, with a word of caution, correctly noting that there is a great deal of literature suggesting that structural variables in school systems are influential in determining the policy. At the very least such research should serve as a warning to educators and political scientists against making simple assumptions about policy consequences of political system characteristics to the point that structural considerations affecting school policy making are ignored.

III. RESULTS

A. A model was developed seeking to demonstrate the systemic interrelationship of vocational educational programs to the political economic and social forces at work in a state or community.

B. Iowa, Montana, Louisiana and Wisconsin were selected for study as states with sizeable rural or non-metropolitan populations where vocational education programs differ significantly both as to structure and as to type and degree of commitment to financing.

C. In-depth analysis of the statutes and administrative rules the four states was completed.

D. Interviews were conducted with key educational administrators, legislators, and legislative research bureau directors who deal regularly with the private-group and public forces at work in shaping a vocational education system.

E. In conjunction with another project, a paper titled "The Effects of Governmental Structure and Administration Upon Public Education Systems" was prepared by Donald E. Boles.[1]

It is expected that it will appear as a chapter in a book to be published in the near future.

F. As something of a sidelight, but relying in part on information acquired during the course of this project a paper was completed and presented at the Iowa Conference of Political Scientists meeting April 20, 1968. It is titled, "The Courts, Religion and Education: The Slippery Wall of Separation"[2] A significant portion dealt with federal educational laws enacted within the last decade which permitted the use of public funds for private and parochial schools and the resulting problems and litigation.

G. From interviews and other research it seems apparent that there are sharply divided opinions among policymakers and school administrators concerning the educational theory of a man who is entrusted to direct and develop the main thrust of a state's vocational educational programs. The different schools of thought inclue, at least, each of the following:

1. The proponents of the "old trade school" concept.
2. The proponents of a strictly "academic school" approach to vocational and technical education.
3. The proponents of the strictly "technical" or quasi-engineering school.
4. The proponents of the "new school" concept which reconceptualizes these schools' role toward various programs traditionally offered at colleges and universities such as journalism, data processing and computer programing.

H. This debate is far from academic and draws powerful and sometimes strident dissent from diverse constituencies within the political and socio-economic spectrum of the community.

IV. DISCUSSION

At the outset of the second phase of this study, a questionnaire on vocational education was sent on March 9, 1967, to eighteen of the fifty states. The purpose of the questionnaire was to obtain specific information for a federal project titled "An Analysis of Legal and Political Problems and the Strategy Necessary for Implementing Programs Under the Vocational Education Act of 1963" (contract-E-5-85-108). Since the project is designated to deal with non-metropolitan areas the states with a 45-65% urban population were selected for initial study (see Chart I).

Nine of the eighteen states responded to the original March 9th request, four to the April 24th follow-up request. Three states sent no response whatsoever and three more sent varied reasons for not completing the questionnaire, (see Chart II). Of these three, one, Minnesota, indicated willingness to co-operate in a personal interview.

The items included in the questionnaire were selected from a comprehensive list of information needed on the eighteen states. It should be emphasized that the major purpose of the questionnaire was to obtain specific information on each state and not to quantify and generalize about all fifty states on the basis of the eighteen. In other words the eighteen states were not considered as a sample.

The questionnaire was divided into four major categories: I. Vocational Education Programs, II. Structure of Vocational Education--Formal and Informal, III. Further Information, and IV. Additional Comments. Part I included questions about vocational education needs, programs, and budget. Part II covered formal administrative structure and formal and informal influences. In Part III the names and addresses of people who could provide further information were requested. And finally, Part IV, invited the states to make "any additional comments."

A. Questionnaire Results and Evaluations

The first question under Part I, "Programs" was A. "Are your state's needs for vocational education programs being adequately met?" It was hoped that this question

Chart I

Selection of States for Initial Study[1]

North East		Middle Atlantic		East North Central	
State	% Urban	State	% Urban	State	% Urban
Maine	51.3	New York	85.4	Ohio	73.4
New Hampshire	58.3	New Jersey	88.6	Indiana	62.4
Vermont	38.5	Pennsylvania	71.6	Illinois	80.7
Massachusetts	83.6			Michigan	73.4
Rhode Island	86.4			Wisconsin	63.8
Connecticut	78.3				

West North Central		South Atlantic		East South Central	
Minnesota	62.2	Delaware	65.6	Kentucky	44.5
Iowa	53.0	Maryland	72.7	Tennessee	52.3
Missouri	66.6	District of Columbia	100.0	Alabama	54.8
North Dakota	35.2	Virginia	55.6	Mississippi	37.7
South Dakota	39.3	West Virginia	38.2		
Nebraska	54.3	North Carolina	39.5		
Kansas	61.0	South Carolina	41.2		
		Georgia	55.3		
		Florida	73.9		

West South Central		Mountain		Pacific	
Arkansas	42.8	Montana	50.2	Washington	68.1
Louisiana	63.3	Idaho	47.5	Oregon	62.2
Oklahoma	62.9	Wyoming	56.8	California	86.4
Texas	75.0	Colorado	73.7	Alaska	37.9
		New Mexico	65.9	Hawaii	76.5
		Arizona	74.5		
		Utah	74.9		
		Nevada	70.4		

1. From the 1960 U. S. Census

Chart II

Response to the Vocational Education Questionnaire

	March 9 answer original	April 24 answer follow-up	no response	answer other
Maine	x			
New Hampshire	x			
Iowa	x			
Nebraska				x[1]
Virginia				x[2]
Georgia	x			
Tennessee		x		
Alabama		x	x	
Montana			x	
Wyoming	x			
Indiana		x		
Wisconsin	x			
Minnesota				x[3]
Kansas		x		
Louisiana	x			
Oklahoma	x			
Oregon			x	
Idaho	x			

1. Nebraska responded with the comment, "We have sufficient number of problems without encouraging others."

2. Virginia responded with a letter stating, "Since we are involved in several state-wide studies and activities, we feel that, at this time, we will not be able to do justice to your study and research project. . ."

3. Minnesota responded that they did not have time or staff to answer the questionnaire but would be willing to cooperate in a personal interview. This was conducted on June 2.

would obtain the states self evaluation of their existing programs. However, since eleven of the fourteen states that responded answered "No" with no indication of their criteria for self evaluation, more revealing results might have been achieved if the questionnaire had contained a specific criteria for evaluation or perhaps if the phrase "Please comment" had been added. Complete answers to this question are in(Chart III, section A.)

The second question of Part I was: B "Are these needs greater for the rural (towns less than 2500 and farms) or the urban segment of your population?" This again was seeking a self-evaluation by the states of their most critical area with respect to vocational education. Seven of the fourteen answering states indicated problems are equal in both areas. This may be true or may simply mean that the states look at themselves as being homogeneous rather than the product of two quite different types of society. The answers to this question were valuable, in that they revealed some indication of the states self image and of the types of questions that should be asked in personal interviews. This question might have been more useful if the short question "Why" had been included. For complete answers to question I-B (see Chart III, section B.)

Section C of Part I was: "Please describe briefly on the back of this sheet any existing or proposed vocational education programs in your state. Include approximate date of initiation." Three states--Maine, Alabama, and Louisiana--did not answer this request. Others indicated frustration with the generality of the task. It perhaps would have been more productive to request any, printed materials describing existing programs which some states sent anyway or ask simply how many area vocational schools, high school programs, etc. they have. The information received was informative about the specific states but because of the varied forms not suitable for comparison.

The next question of Part I was D. "Are any of these programs under the National Vocation Education Act of 1963? If so, please specify." Thirteen of the fourteen responding states answered "yes" to this question without going on to be more specific. Although it

Chart III

A. "Are your state's needs for vocational education programs being adequately met?"

B. "Are these needs greater for the rural (towns less than 2500 and farms) or the urban segment of your polulation?"

C. See Chart IV.

D. "Are any of these programs under the National Vocational Education Act of 1963? If so, please specify."

State	Answer A	Answer B	Answer D
Maine	No	Rural	Yes
New Hampshire	No	Equal	Yes
Iowa	No	?	Yes
Georgia	No	Equal	Yes
Tennessee	No	Equal	Yes
Alabama	No	Equal	Yes
Wyoming	No	Equal	Yes
Indiana	No	Urban	Yes
Wisconsin	?	?	Yes
Minnesota	Fairly Well	Rural (slightly)	Yes
Kansas	No	Equal	Yes
Louisiana	No	Urban	Yes
Oklahoma	Improved	Urban	Yes
Idaho	No	Equal	"Any or all could be"

was useful to have an indication of awareness of the 1963 Act, requesting the amount received from the Act by each state would have been much more revealing, supplying a vital part of a quantified index of awareness and participation. For answers given to question D, part I, (see Chart III, D.)

The final section of Part I was a budget chart to be filled in with raw figures and percents. It asked basically: E. 'What was your 1966 vocational education budget total? What percent of it came from each of the following?--National, State, Local. What percent was this budget of your total education budget? What percent of your state"s 1966 total budget was the education budget?"

Seven of the fourteen states left parts of the chart blank. Others sent figures different than those requested from which the desired figures could be calculated. The main problems with this question were variance of budget terminology and figures kept and could not be avoided. It would have been wise to break the "federal" figure into Smith-Hughes and 1963 Act categories since we are primarily interested in the 1963 Act. For the budget figures received, (see Chart IV.)

Question A of Part II, Structures, was: "Who (individualy or agency) in your state"s government is formally responsible for Vocationa Education? (position and name, if possible)". This question received fairly satisfactory results. However, it would have been valuable to ask specifically if they have a State Board of Vocational Education and if it is one and the same as the State Board of Education. Some states indicated this but others where the situation exists did not. Complete answers are in(Chart V, Section A.)

In Section B, it was asked "Is this person or agency appointed or elected?" Only three of the states--Alabama, Indiana, and Louisiana--answered "Elected". Answers from all the states are in (Chart V, Section B.)

Section C of the questionnaire was a chart to be completed on formal influences on vocational education.

Chart IV.

Budgets

State	1966 Voc. Ed. Total	% From Federal	% From State	% From Local	% of Total Educ. Budget	Educ. % of Total
Maine	4,418,172*	31.1*	58.8*	10.1*	6.0	30.0
New Hampshire	1,000,000[1]	90.0	8.0	----	8.0	----
Iowa	6,203,483[1]	61.3*	38.7*	----	?	?
Georgia	19,720,627[2]	34.0	27.0	39.0	3.0	58.2
Tennessee	16,981,048[2]	36.0[3]	32.0[3]	32.0[3]	?	?
Alabama	22,018,132[2]	26.8[3]	34.4[3]	38.8[3]	7.7[3]	40.6[3]
Wyomong	601,901[2]	98.3[3]	1.7	Remainder of match	16.0	5.0
Indiana	15,975,694[2]	34.2*	8.2*	57.3*	not yet determined	not yet determined
Wisconsin[4]	----	----	----	----	----	----
Minnesota	19,006,733	27.2	38.0	34.8	----	----
Kansas	7,960,435	36.0	11.0	53.0	8.0	18.7
Louisiana	14,403,915	35.6*	4.5*	59.9*	3.4	36.3
Oklahoma	12,645,419	26.3*	8.7*	65.0*	1.1	25.0
Idaho	3,000,000	33.3	33.3	33.3	5.0	36.0

*Figures calculated from information given on questionnaire.
Underlined = approximate figure.
1. State budget does not include local.
2. Rounded to nearest dollar.
3. Rounded to nearest tenth of a percent.
4. 1967 Budget.

Chart V.

State	A. (Responsible for Vocational Education)	B. (Elected or Appointed)
Maine	State Board of Education	Appointed
New Hampshire	Neal Andrew, Chief Division Vocational Technical Education State Department of Education Concord, New Hampshire	Appointed (State classified employee)
Iowa	State Board of Public Instruction (as the State Board for Vocational Education (D.P.I. D.V.E.))	Appointed
Georgia	State Board of Vocational Education	Appointed
Tennessee	Education Officer--State Board for Distributive Education--Assistant Committee for Distributive Technical Education.	Appointed
Alabama	State Superintendent of Education	Elected
Wyoming	State Board of Education which is also the State Board for Vocational Education	Appointed by the Governor
Indiana	Mr. Richard D. Wells; State Superintendent of Public Instruction State Capitol Bldg., Indianapolis, Indiana 46204	Elected 2 years
Wisconsin	State Board for Vocational Technical and Adult Education	Appointed
Minnesota	Mr. Wick State Director of Vocational Education, Centennial Bldg. St. Paul, Minnesota	Appointed

Chart V. (Continued)

State	A. (Responsible for Vocational Education)	B. (Elected or Appointed)
Kansas	John E. Snyder, Director and Executive Officer, State Board for Vocational Education	Appointed
Louisiana	Louisiana State Board for Vocational Education.	Elected
Oklahoma	State Board for Vocational Education	Appointed
Idaho	Idaho State Board for Vocational Education, S. R. Glenn, State Director.	Appointed (both agency members and department director)

The question essentially was "What branch of government formally initiates vocational education programs or policy? (Please check or comment). What branch has traditionally and formally hindered programs or policy of this nature most over the years?" These two questions obtained some interesting information valuable for formulating interview questions. Several states were hesitant to answer the question on "hinderances" directly. For answers given to both questions in the form requested (see Chart VI.)

Question D. of Part II asked about informal influences on vocational education. "What governmental or nongovernmental group or individuals informally promote vocational education programs or policy?" Most states answered the first part of this question, listing organization and general groups who informally promote vocational education. Ten of the fourteen states gave no answer or answered "none," to the second part of this question. The five answering "none" and the four giving more extensive replies provided insight into the things that should be explored in the field work.

Those giving no answer leave doubt as to whether there really are no hinderances or if the situation is so delicate they would rather not discuss it. If the latter is true--the project might be of value to these in the state who are interested in improving vocational education. However, more cooperation in answering questions such as this will be necessary if the real sources of the various problems are to be discovered. For complete answers to question D of Part II, (see Chart VII.)

In Part III, Information, two similar questions were asked: "A. To whom should further requests for information about your state"s vocational education be directed? (name, address and telephone);" B. "To whom should requests for state publications on vocational education, laws, etc. be directed? The query went on to ask the name, address and telephone. These two questions turned out to be somewhat redundant with eleven of the fourteen states answering them with the same name and address. The information was used to write for publications and to

Chart VI

C. Initiate Programs

	Executive	Legislative	Department
State Government	Tennessee	Wisconsin	Maine-Education New Hampshire Iowa-State Board Georgia Tennessee Alabama Wyoming-Education Wisconsin Minnesota-Program Committee Kansas Louisiana State Board Oklahoma Idaho
Local Government	Georgia Kansas-schools		Maine-Education Iowa-Boards Tennessee Indiana-School Board and Superintendent Oklahoma Idaho

Hinder Programs

	Executive	Legislative	Department
State Government	Tennessee	Georgia Tennessee Kansas	Tennessee Indiana

Chart VI. (Continued)

	Hinder Programs (Continued)		
	Executive	Legislative	Department
Local Government	Tennessee Indiana-Superintendent	Georgia Tennessee	Iowa-Boards Tennessee Alabama Wyoming-Boards Indiana-Board
Other Hinderances	"lack of funds"--Maine, Iowa "none"--Maine, Louisiana, Oklahoma, Idaho " ? "--Wisconsin "All cooperate"--Minesota "no answer"--New Hampshire		

Chart VII.

Informal promotion or Hinderance

State	Promote	Hinder
Maine	State Board of Education Industrial Development Council Others	None
New Hampshire	No answer	No answer
Iowa	Division of Vocational Education	No answer
Georgia	No answer	Lack of funds
Tennessee	State Division of Vocational-Technical Education	Executive Legislative Department
Alabama	No answer	No answer
Wyoming	State Department of Education Division of Vocational-Technical Education	Some professional groups NCATE and TEPS in some cases and teachers themselves are often responsible
Indiana	Universities Farm Bureau AFL-CIO Chamber of Commerce Tax Payers Association Indiana Legislature	No answer
Wisconsin	No answer	No answer
Minnesota	Local Business	None

Chart VII. (Continued)

State	Promote	Hinder
Kansas	Labor Chamber of Commerce PTA KVA Industrial Development	Junior Colleges
Louisiana	Business and Industry Department of Commerce and Industry State Legislators	None
Oklahoma	State Department of Vocational Education	None
Idaho	Advisory committees Civic groups	None especially

make arrangements for personal interviews. Of the states answering there was 100 per cent response to this non-controversial item (see Chart VIII.)

The questionnaire revealed among other things some of the many pitfalls in obtaining meaningful answers which involved extremely controversial administration and political decision making processes. Moreover, the delicate literary gavotte which characterized the manner in which some of the questions were answered suggests an intensity of emotions concerning policy decisions and budgetary allocations, that only those fully familiar with the inner world of educational administration and politics can appreciate. Such internal conflicts seemed especially noticeable in state administration agencies which had control over both the vocational and technical schools and the "academic" schools. It seems pointless to ignore the effect of fundamental difference in educational philosophy upon the law and policy making process affecting vocational and technical educational programs.

The statute law and administrative rules of the four states studied in depth ranged from the highly detailed and codified statute law of Wisconsin to the almost non-existent statutory provisos of Montana. Wisconsin and Louisiana have the oldest and most extensive vocational systems, however, the Louisiana statute law is less detailed. This is perhaps traceable to the fact that the financial support for the schools comes almost entirely from the state level and is administered primarily from the state level also. In the case of Wisconsin, fiscal independence is given the local vocational school boards, and this, coupled with a high degree of local administrative autonomy, accounts in part for the more detailed statutory constraints. This is consistent with most patterns of local governmental law, where Dillon's rule prevails. This judicial doctrine of long standing, of course, stipulates that a local governmental agency may do only those things specifically authorized to it by the state government.

Chart VIII.

Sources of further Information

State	Further Information	Publications
Maine	John A. Anell, Chief Bureau of Vocational Educ. State Dept. of Education Ph. 623-4511	Same
New Hampshire	Neal Andrew, Chief Division of Voc-Tech. Educ. State Dept. of Education Concord, New Hampshire	Same
Iowa	State Director of Voc. Educ.	Same
Georgia	Dr. J. E. Bottoms Associate State Director Vocational Education State Department of Educ. Atlanta, Georgia 30334 Ph. 404-688-7390 Ext. 233	Dr. Allen C. Smith Associate Superintendent Address: Same Phone: Same Ext. 263
Tennessee	C. M. Dunn 205 Cordell Hall Bldg. Nashville, Tennessee 37219	No Answer
Alabama	J. F. Ingram State Dept. of Educ.	Same
Wyoming	Charles A. Kline State Director Voc.-Tech. Educ.	Same
Indiana	Richard D. Wells State Superintendent of Public Instruction	H. Robert Hewlett Director of Voc. Educ. 600 Old Trails Bldg. 309 West Washington St. Indianapolis, Ind.

Chart VIII. (Continued

State	Further Information	Publications
Wisconsin	C. L. Greiber State Director of Voc-tech Educ., 1 West Wilson St. Madison, Wisconsin	Same
Minnesota	Mr. Wick, State Director Vocational Education Centennial Bldg., St. Paul Minnesota	
Kansas	John E. Snyder, Director 11th Floor State Office Bldg. Topeka, Kansas PH.CE 50011-555	Same
Louisiana	William E. Johnson Assistant Superintendent for Voc. Educ.	Same
Oklahoma	J. B. Perky, State Director Vocational Education, 1515 West 6th Street, Stillwater, Oklahoma PH. FR-2-6211 Ext. 458	Same
Idaho	S. R. Glenn State Director of Voc. Educ. 518 Front Street Boise, Idaho	Same

From the standpoint of the effects of partisan politics, there seems no question in the investigator's mind that they play an infinitely greater role in the vocational and technical school systems of Montana and Louisiana than they do in the states of Iowa and Wisconsin. In the latter two states this study was to encounter no instance of any significant partisan intrusion into the policy making or administration of these programs. Various local or regional rivalries were indicated in Iowa, but even these were not apparent in Wisconsin, primarily, it would appear, because of the universal rather than the regional nature of the schools. Montana, while just becoming aware of the potential of vocational and technical education and also of the favorable effects of area vocational schools to the city in which it is located, was in the Summer and Fall of 1967 gearing itself for a major battle over the location of the schools. The schools in Louisiana from all indications developed on an individual basis traceable in part to the influence of local legislators within the state's legislature.

The last annual report contained a description of the evolving area vocational-technical schools in Iowa. There would seem some merit in briefly portraying the structure of the vocational school system in the other three states. This will demonstrate, at the very least, the highly diverse statutory and administrative systems within non-metropolitan states.

B. Wisconsin

It would seem logical to begin this description with the State of Wisconsin's vocational-technical school system, since Wisconsin was the first state to develop such a system. It was in the year 1909 that plans to establish such a program began to materialize in that state. Before that time few Wisconsin high schools gave training in industrial arts and industry-related areas. The emphasis at that time was almost entirely upon academic or college preparatory courses. There was no attempt made to train people to control the growing industrial needs of the state. Compulsory school laws of that period only included children of 14 years of age and under. Therefore, this resulted in thousands of young people leaving public schools upon reaching their 14th birthday and drifting aimlessly because of lack of job preparatory training. The commission on the improvement of educational systems, in its report titled Vocational Education, stated that in 1911 about 40,000 youngsters from 14 to 18 years of age had no connection with any educational institution in the state. There were in 1910 104,000 illiterates in the state.

Dr. Charles McCarthy, who was at that time Chief of the Legislative Reference Library, may in a real sense be considered the prime mover of the vocational system in Wisconsin. Appalled at the large number of young people who dropped from the public schools when they became 14 years old as well as the disregard in that state for training people to fill the state's industrial needs, McCarthy made a thorough study of the problem. His findings were eventually conveyed to Senator E. T. Fairchild of Milwaukee. The Senator was so impressed by the information that he introduced a resolution into the 1909 legislature creating a committee on industrial and agricultural education. The committee's job was to investigate why such a large number of children over 14 years of age were not in school. The committee, which was composed of the state superintendent of public instruction, the president of the university, superintendent of Milwaukee public schools and McCarthy, was to report back to the 1911 legislature on ways to establish an educational program for the unemployed young people in the state.

Dr. McCarthy did the active work involved in the committee study. At the outset, he made a trip to Europe to study what was being done there in the way of vocational education. The major portion of his time there was spent studying the German system. But while the ideas involved were drawn largely from German practice, the vocational school law adopted in Wisconsin more closely resembles that of Scotland. The Scottish law gave more latitude to localities and did not include the tendency toward central government domination so characteristic of German law pretaining to vocational schools. The actual internal operation of this school, however, follows more closely the continuation and apprentice schools of Germany.

The 1909 legislative committee report resulted in the first legislative enactments relating to vocational education in 1911. A state board of industrial education was created, and the first statewide continuation school law in the United States was passed. The state board of industrial education was composed of nine members, three employers, and three employee members and were chosen by the governor. The Dean of the University College of Engineering, the Dean of the University Extension Division and the State Superintendent were _ex officio_ members of the board. Upon the nomination of the state board, the state superintendent appointed a director of vocational education to supervise the work of this division. The commission on the improvement of the educational system in it's report titled _Vocational Schools_ concluded, however, that the state board had little real power. This initial law also provided for the establishment of local boards to operate the vocational school and establish the manner in which individual schools were to be created. The provisions closely resemble present statutory regulations with the exception that the early law required cities above 5,000 population to levy a 1/2 mill tax for the support of such schools. In modern times this figure was raised to a mandatory two mill tax if the local vocational board chooses to request it. However, in recent years they have not seen the need to do so.

Other portions of the law provided that persons 14 years of age or older who resided in the city were to be admitted to the schools free. Furthermore, children between 14 and 16 years of age were required to attend such schools at least five hours a week. Additional statutory provisions dealing with vocational education were adopted in the 1915 legislature. State aid was limited to not more than $10,000 for any one city. This aid was to be prorated if necessary. Attendance provisions were increased and extended. Employed youngsters 14 to 16 years of age had their choice of either taking five hours of vocational training per week for eight months or four hours per week for ten months. Moreover, employed juveniles 16 to 17 years of age had their choice of takingeither five hours of vocational education per week for six months or four hours per week for eight months.

These measures, however, were not enough to stop the constant arguments in Wisconsin over jurisdiction which had raged since the inception of the vocational system in 1911. Momentous changes were made in the whole structure of the vocational system in the 1917 legislative session aimed at stilling these jurisdictional debates. It might be added emphatically that these early debates in Wisconsin can be heard in some of the states which are at the present moment beginning to develop vocational school systems. Chapter 394, laws 1917 removed the vocational school system from the jurisdiction of the state superintendent of public instruction. The title of the reconstituted board was changed to the state board of vocational education. This board consisted of 11 members: three employers, three employees, three farmers (all appointed by the governor), the state superintendent of public instruction, and one member of the industrial commission who was selected by the commission itself. This plan is still in use today.

Also during the 1917 legislative session, provisions of the federal Smith-Hughes Act which had recently been enacted had been made effective in Wisconsin. It was to comply with provisions of this act that the state board's name was changed to the state board of vocational education. It was this board which was named by the legislature to cooperate with the federal government in applying the Smith-Hughes Act in the state.

In that year the state board of vocational education was also given power to establish qualifications for vocational school teachers and to approve courses of study offered in the vocational schools of the state. It can be said that the legislation of 1917 established the basic lines along which the vocational school system still operates in Wisconsin. Needless to say, however, legislation seeking to improve and enlarge the coverage and content of the vocational education has continued to be enacted.

The basic concepts of the Wisconsin vocational system which have evolved from the above mentioned legislation which basically endures to the present time have been well summarized by the commission on the improvement of the educational system in it's report in Vocational Education. These principles are:

1. Compulsory school attendance for all youngsters at least on a part-time basis.
2. Separate administration of the vocational school system.
3. Separate funds for its operation.
4. A grass-roots board to administer the program.

The laws of Wisconsin provide that every town or city over 5,000 population shall create a local board of vocational and adult education, and in cities with a population of less than 5,000 such a board may be created. It further provides that when a number of electors equal to three percent of those voting in the last general election for governor from any district, the schools of which are classified as integrated shall petition the county clerk at least 30 days prior to the next general or primary election for a referendum on the question of establishing a local program of vocational and adult education, the county clerk must provide for such referendum at the county's expense. This section further states that when such a referendum shall favor the establishment of this type of program, the school district shall appoint a local board of vocational and adult education.

The board structure of vocational schools is organized on a hierarchical pattern of local boards at the base charged with the day to day management of the individual schools and a state board of vocational and adult education at the apex exercising general supervisory and general policy formulating functions. The local board is charged with the control and maintenance of schools of vocational and adult education and has as its duty to "establish, foster and maintain" vocational schools for instruction and trades, industries, agriculture and household arts in part-time day, full-time day and evening classes and in other courses which are of the more "academic" nature. The local boards are composed of five members, of whom two must be employers and two must be employees. The fifth member is either the city superintendent of schools or the principal of the high school in those localities which do not have a city superintendent. A slightly different method is required for the selection of board members in areas where school districts establish schools of vocational and adult education. Here the board consists of the district school administrator and six other members. Three of these must be employers and three must be employees who are not foremen or superintendents. A further provision requires that two members of the board must reside in unincorporated areas in the district.

Advisory Committees are important adjuncts of the local boards of vocational and adult education. These committees are approved by the board for the purpose of aiding in selection and installation of equipment, in determining the content and method of vocational courses, as well as in guidance and follow-up work in each occupation. Of course it must be emphasized that advisory committees are authorized to make recommendations and suggestions only. The Industrial Commission also helps make extensive use of the advisory committees in apprentice training programs. The responsibility is to make recommendations regarding the labor aspects of apprenticeships, wages, scheduling of training on the job, employer qualifications and similar matters. The commission determines whether a school committee organized by a local board of vocational education meets the commission's requirements.

On a state level, the state board of vocational and adult education is an eleven member body consisting of nine members appointed by the governor. They include the state superintendent of public instruction and a member of the industrial commission who is selected by the commission. Of the members appointed by the governor three must be employers of labor, three must be skilled employees and three must be practicing farmers. The appointed members serve for terms of six years. The board employees include a full-time director of vocational and adult education and a large staff.

The state board has responsibility for general development and supervision of the work of vocational and adult education in the state. It also has control over the distribution of all state and federal aid for vocational and adult education in Wisconsin. The ultimate power that the state director of vocational and adult education acting for the state board may exercise over the local boards of vocational education is the power to cut off state aids if the local school does not conform to statutory requirements or legal regulations adopted by the board. As far as the larger vocational schools are concerned, this power is more apparent than real, since an almost insignificant proportion of their budget is derived from state aids. Several years ago, for example, approximately three percent of the Madison vocational school budget came from state funds while in Milwaukee the figure was approximately one percent. There appears no case on record, however, where local school boards refused to comply with directors of the state board of vocational and adult education, although there have been occasions where the state board has threatened to cut off state aid to local schools.

Over the years, veteran observers of the legislative process in the state of Wisconsin are in general agreement that the vocational school system has received most favorable treatment. No one seems to be able to recall any major legislative attack directed at any significant portion of the program. In part this is due to some extremely astute public relations work on the part of the director and his staff and in part on the general composition of the board which crosses a variety of different constituencies.

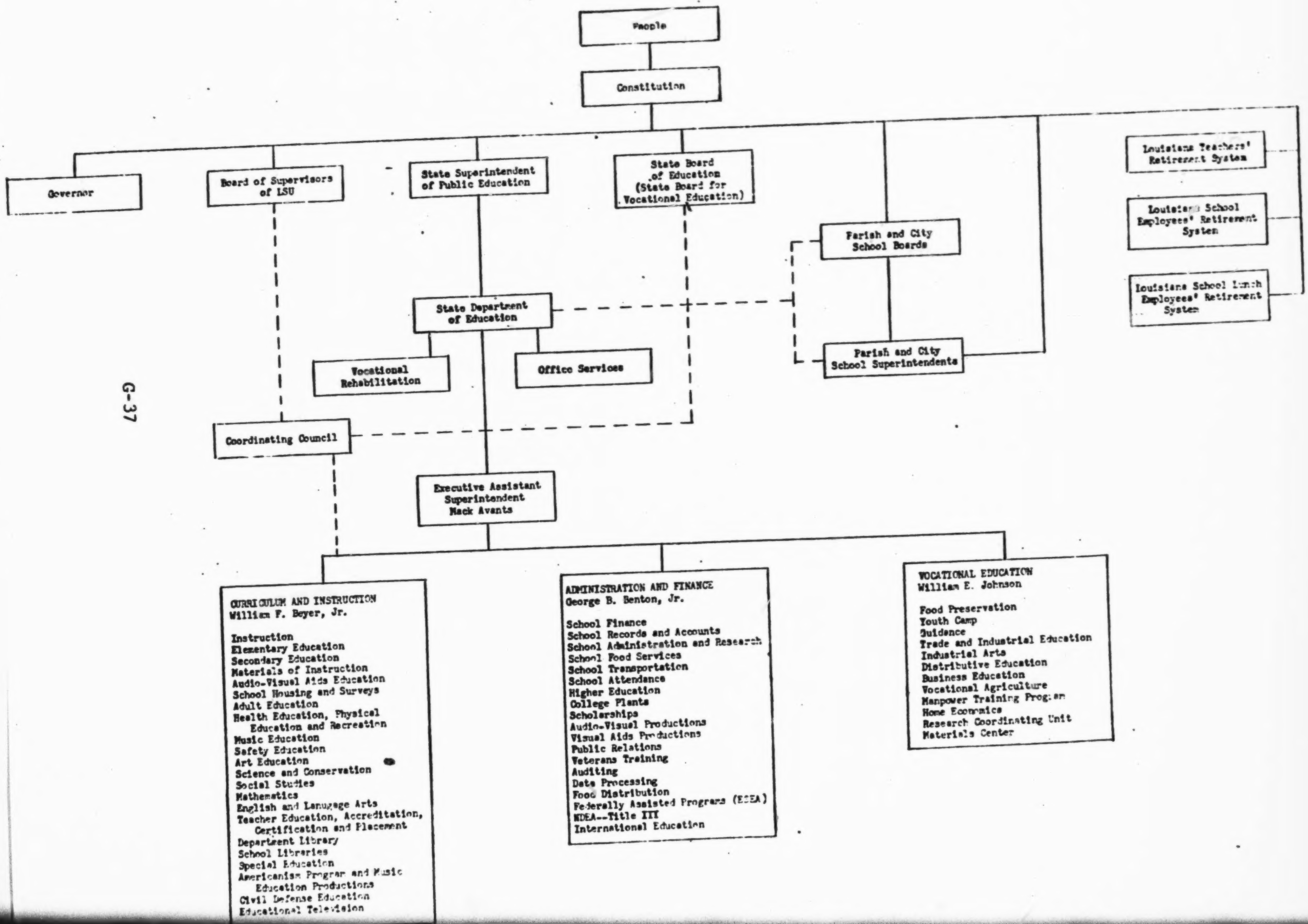
C. Louisiana

There is a sharp difference between the administrative structure of vocational education administration in the State of Wisconsin and the state of Louisiana. Louisiana is one of the states that has its vocational education program under the state board of education and more specifically under the state superintendent of public instruction. Moreover, there is not the detailed and intricate body of statute law and administrative rules governing the variety of both structure and programs in the state of Louisiana. Such statute law as exists is on the order of specific programs or specific budgetary grants. Nonetheless, Louisiana does have a very well developed system of vocational schools.

Unlike Wisconsin, where the finances tend to be primarily derived from local sources, in Louisiana the schools are all state supported. They are much more recent in origin than in Wisconsin, beginning in the middle and early 30's. There is a difference of opinion among various people who were interviewed as to the influence of Huey Long and the Long organization in the establishment of these schools. It is worth noting, however, that on occasion the point was volunteered. Rather than

FIGURE III

ORGANIZATIONAL STRUCTURE OF LOUISIANA'S EDUCATIONAL SYSTEM


People
Constitution
Governor
Board of Supervisors of LSU
State Superintendent of Public Education
State Board of Education (State Board for Vocational Education)
Parish and City School Boards
Parish and City School Superintendents
Louisiana Teachers' Retirement System
Louisiana School Employees' Retirement System
Louisiana School Lunch Employees' Retirement System
State Department of Education
Vocational Rehabilitation
Office Services
Coordinating Council
Executive Assistant Superintendent Mack Avants
CURRICULUM AND INSTRUCTION
William F. Beyer, Jr.
Instruction
Elementary Education
Secondary Education
Materials of Instruction
Audio-Visual Aids Education
School Housing and Surveys
Adult Education
Health Education, Physical Education and Recreation
Music Education
Safety Education
Art Education
Science and Conservation
Social Studies
Mathematics
English and Language Arts
Teacher Education, Accreditation, Certification and Placement
Department Library
School Libraries
Special Education
Americanism Program and Music Education Productions
Civil Defense Education
Educational Television
ADMINISTRATION AND FINANCE
George B. Benton, Jr.
School Finance
School Records and Accounts
School Administration and Research
School Food Services
School Transportation
School Attendance
Higher Education
College Plants
Scholarships
Audio-Visual Productions
Visual Aids Productions
Public Relations
Veterans Training
Auditing
Data Processing
Food Distribution
Federally Assisted Programs (ESEA)
NDEA--Title III
International Education
VOCATIONAL EDUCATION
William E. Johnson
Food Preservation
Youth Camp
Guidance
Trade and Industrial Education
Industrial Arts
Distributive Education
Business Education
Vocational Agriculture
Manpower Training Program
Home Economics
Research Coordinating Unit
Materials Center

to describe in detail the educational system of the state of Louisiana the following organizational chart is utilized and will, it is believed, reveal the structure in a more meaningful fashion. See Figure III.

One interesting point should be emphasized that is not revealed on the organizational chart just illustrated. It concerns the budgetary functions of the state board of education. While the state board of education is also legally the vocational board and has control over vocational education, nonetheless, each director of each vocational school is authorized to make budget proposals to the state department of instruction. State department representatives of vocational education then carry these to the state board. The state board then takes these to the budget committee of the legislature, but once in the legislature each director of each vocational school makes the presentation of his needs and his case to the committee itself. In essence, then, the local vocational school director plays a key role in budgetary processes in the state despite the apparent overall control of the state board. There was some ambivalence in the discussion concerning the precise role of the director in this process among those interviewed. It would appear, however, that the role of the local director is a key one and the budgetary allocations made by the legislature are primarily tied to the type of case the particular director makes rather than those of the overall board proposals and recommendations.

In discussions with state legislators, state administrators charged with vocational education, and people at Louisiana State University who have been long associated with vocational education programs in the state, there was a unanimous feeling that the state legislature over the years has treated vocational education in that state as well as higher education, which it was felt had been treated on the whole most fairly. Moreover, there was the additional feeling that the state legislature in the last few years has been even more predisposed to support vocational education than it has been in the past. The primary reason given for this increased interest in vocational education was the federal legislation beginning in 1963 which encouraged the state legislature to become even more concerned and involved in the area. Louisiana, as will be shown in the case of Montana, is a good example of a state that has moved more dramatically ahead in vocational education primarily because of federal involvement growing out of the Vocational Education Act of 1963.

The enrollment in vocational schools has increased in Louisiana between 1965 and 1968 quite noticeably. In part this is traceable to the adding of new programs, particularly in the field of office training oriented programs and in health occupation programs. Distributive education is another area in which there has been a marked increase in enrollment. Moreover, an analysis of the types of students entering vocational technical schools in Louisiana indicates substantially divergent types in the period since 1965 from those who have normally enrolled in such programs prior to that time. Since 1965 there have been substantial numbers of high school graduates and indeed some people with some college training who for a variety of reasons, including the lack of academic motivation, have successfully completed programs of a technical nature in the vocational schools of that state. It is the feeling of the administrators in the state department of instruction that this trend will continue. Moreover, the success of the graduates of these programs has apparently resulted in substantial spin off in influencing others to enroll. This is especially true of those who have seen their parents eke out a living at fishing and trapping at a substandard economic level but as students would normally become insecure in attempting to pursue college or university type courses. Concerning the role of politics in its broad sense and its effects upon educational policymaking in Louisiana, this observer is struck by the highly political quality of the appointments and the awareness to political pressures in the state department. The interviewer was informed while studying the situation in Louisiana that the present superintendent of public instruction had been elected some three years earlier and had substantially eliminated many of the people and places of authority in the state department. Thus there was a substantial number of relatively new although apparently quite able people holding positions of top level of authority. Nonetheless there were some who, one had the impression from interviewing them, were "patronage type" appointments who tended to rather supervise the supervisors. How much of this is in fact effective in altering policy making is impossible to tell from the short period of time that the interviewer was able to spend in the State of Louisiana. But in contrast to Wisconsin, where one had the feeling that the policymakers were for all intents and purposes oblivious to the pressures of politics and elections and their influence upon programs, the situation was noticeably different in Louisiana.

D. Montana

Montana is an excellent example of a state which had, for all intents and purposes, no system of vocational education prior to passage of the Federal Vocation Education Act of 1963. No one interviewed, including legislators, state and local school administrators and representatives of the Montana Teacher's Association, evinced the slightest doubt that the intense interest in vocational education in 1967 when the interviews were carried out was traceable to the national government's involvement in the area. This was reflected in a variety of ways. For example, the state department of public instruction was reorganized to include a division on vocational education. Also, major and open rivalry existed among the cities of the state vying with each other for the limited number of area vocational schools.

Montana, of the states studied, without question had the sharpest partisan and political differences interwoven in its education policy making and administration. Indeed, the state superintendent of public instruction, a position which is elected on partisan ballot, is something of a political phenomenon in herself within the state. She first ran as a Republican and defeated the incumbent. The second four year term she also ran as a Republican, and the day before the final date of filing for her third four year term she announced that she would run as a Democrat. Needless to say, this did not help her win any popularity contests among the Republicans in Montana, since the time constraints were such that it was impossible for their candidate to be given serious consideration.

Returning to the question of state legislation governing vocational education in Montana, it may be said that until the 1966-67 session of the legislature, for all intents and purposes, the only legislation governing such programs was of the old type which referred to manual training in the general academic high schools of the state. Specific references to vocational and technical training in the statute laws of the state were made only after the enactment of the Vocational Education Act of 1963.

From the standpoint of the administration of education on the state level, it may be said that the board of education in Montana wears several hats. It is, first, the state board of instruction. It is, second, the state board of regents for state higher education and it has now a third major function, that of the board of vocational education. Various state house observers who revealed astuteness of the political processes pointed to the fact that this structuring from an administrative standpoint makes it a most difficult job for the board of education to perform all of its functions. Since it spends between 65 and 75 percent of its time as a board of regents, there is little time left over to be given to public education or to even newer and less-known field of vocational education. The fact that the board of education has little time for anything else other than higher education is revealed in a variety of ways. The budgetary requests, prior to 1967, ran on the order of magnitude of only $45,000 a year for vocational education. For the 1967 bienium this figure jumped to $900,000. In addition to this, other legislation appropriated $100,000 to Haver College for the purpose of specifically training instructors for vocational and technical programs. An additional indication of the casual interest shown in vocational education in the state may be seen by the fact that Montana lost $436,351 in federal funds for vocational technical education in 1965 because of the inaction on the part of the legislature in providing the necessary machinery for acquiring the money.

A second major administrative difficulty which various observers called to the investigator's attention was the fact that in the 1967 session of the legislature the establishing of the vocational technical institute on a general basis was done in such a way that no directions, no criteria and no clear-cut priorities were spelled out by the legislature to enable the board to make systematic and intelligent evaluation of possible sites for the location of schools of this nature. This, of course, increases the possibilities for log-rolling pressures and general political steam-rolling techniques on the part of these communities in the state who seek to obtain the vocational institutes. Because of the substantial amount of money appropriated to it by the legislature, the board of education, recognizing that no guidelines had been established by the legislature, undertook to make a study of the overall needs of the state and the potential resources available. On July 24, 1967, the state board of education announced that Dr. Flesher, retired director of the Bureau of Research of Ohio State University had been appointed to head the research study of vocational needs in the State of Montana. There may or may not be some significance in explaining this appointment in the fact that Mr. Amberison, the Director of Vocational Education of the State Department of Public Instruction in Montana, was receiving his Ph. D. work at Ohio State University and knew Dr. Flesher.

Concerning the location of vocational schools within the state of Montana, there seems to be a fundamental policy difference of some magnititude across the state. This difference of opinion is also shared at the state policy making and research levels. There was the rather clear position of the state board of instruction in the summer of 1967 that the board did not want to establish vocational technical schools in rural areas of the state. There are many who felt that this was a mistake in policy in that it is in these very rural places where the greatest need for the schools might occur, since it is here that the youngsters are going to have to obtain vocational skills necessary to function effectively when they leave that community, since there are no employment opportunities there. On the other hand, of course, there were those who argued the necessity of taking the schools to where the students are, given the limited financial resources available. This, they insisted, could occur only in the major population centers. In general, there was a feeling on the part of the people on the state educational administration level that the primary responsibility for providing funds for vocational schools should come from the federal government. Parenthetically, this is interesting given the extremely conservative nature of the governor and the administration of Montana at that time, who was highly critical of federal intervention. It was this observer's feeling, however, as he traveled and talked to local school administrators and to certain local school boards, that there was a general willingness to supplement federal aid with local and state financial support in order to insure an adequate vocational education system in the state.

Returning to the administrative structure of the vocational education system on a state level, there was difference of opinion again among state house observers as to certain facts and as to certain policies emanating from the office of the state superintendent of instruction. There were those who argued the state superintendent had opposed the establishment of a separate board of education for vocational education. Further research suggested that the fact situation was somewhat more complicated in that at an early stage in the legislative history, the state superintendent said she would in fact support a separate board under certain circumstances. This is particularly true if the present board continued to be bogged down in University matters and did not spend sufficient time on vocational activities. Moreover, the state superintendent had also supported a resolution in the last days of the 1967 legislature which would have established a separate board at that one stage in the legislative process. This bill, in a watered down fashion, passed the legislature but was defeated by the governor because, it was said, he argued that federal funds were being used.

It did not take an especially astute or sensitive person to recognize the very sharp difference in opinion existing between the superintendent's office and governor's office. These differences reached such a degree of intensity that the personnel were not even having coffee together during their coffee break. The state superintendent's legislative skill, however, is revealed by the fact that, when a centralized data processing bill was introduced into the legislature which would have included all departments, by the time it came out of the senate it had been amended to remove the control over centralized data processing for the state department of public instruction. This, of course, meant that the state department of public instruction continues to maintain its own data processing material.

Interviews with various representatives of the state department of public instruction in Montana revealed an interesting fact which was consistent with the practices observed in both Iowa and in Louisiana but was significantly absent in the state of Wisconsin. This is the presence at the initial stages of interviewing representatives of the state department of a nervous, almost supicious, manner of treating researchers other than those within their particular department. There is evidence that this phenomenon not only applies to most people from outside states but in addition to other research agencies within the state which are in many instances interested in helping provide research data to support the departments of public instruction. Indeed if this phenomenon is correct and as consistently present as some observers believe, it may very well prove to be one of the major obstacles to state departments of public instruction in achieving their desired ends within the governmental process because they apparently do not fully appreciate who their true friends really are.

In analyzing the most significant changes in the Montana vocational and technical education system during the 1966-67 period there seemed a consensus that the following stand out as some of the most important. First, appropriations went from $90,000 to $900,000 for the biennium. Second, the board of education, it was felt by people within the state educational administrative structure made a significant contribution by establishing a vocational and technical school advisory committee to work in developing an overall plan for the state. Third, the state department of public instruction had been notably active in the field of vocational and technical education during this period of time and for example, one man with responsibilities in the field of vocational and technical education conducted over 100 meetings throughout the state in a period of less than a year. Recognizing the vast size of the state of Montana and distribution of population within its jurisdiction, this would seem to be most significant feat.

State educational administrators tended to agree that there were several reasons for the relatively tardy development of a vocational technical school system in the state. First, the University system which is under the control of the state board of public instruction, as has been pointed out, consumes most of the board's time. Second, it is felt that the University system acts as something of an octopus which drains off potential fiscal resources as well as those of time that the board might under other circumstances utilize in different fashions. Certainly it was felt that Montana lacked industry except for the mining where it trained its own people. Moreover the industry that it had, required relatively few technically skilled people. Third, it was felt that with the small population of the state and the absence of what might be considered major urban places the incentive for such schools was obscured. Fourth, it was pointed out that the tendency up until the present has been for the people of Montana to send their youngsters to colleges or universities, and in support of this it was noted that between 50 to 55 percent of the students graduating from Montana high schools go on to college. It should be emphasized that they may not finish college but at least they give it a try, and since the state universities and colleges are required to take graduates from accredited Montana high schools, this means that considerable resources are utilized at this juncture which may have relatively small payoffs in the foreseeable future.

The political composition of the legislature is still another reason given for the traditional lack of concern of vocational education in Montana by some astute observers in the state house. The state legislature had historically been controlled by cattlemen, lumbermen and the mining interests. While reapportionment will of course, change some of this, the extent to which this will alter attitudes concerning education is still not clear. In any event these three political and economic forces have traditionally opposed property tax increases of any kind. Prior to the passage of the federal legislation on vocational education in 1963, support for vocational education within the state was strictly a matter of local concern with both funds and controls vested on a local basis. These groups, who are reluctant to see property taxes increase, resist attempts at change. Needless to say, some of this is an over-simplification of all of the forces at work and it is not intended to be a total scientific sample of the legislative attitudes and outlook of the Montana Legislature. But the information was derived from people who spend a good deal of time in state government and should be viewed as something of a consensus of "informed sources". It can be said, however, without fear of controdiction that as of 1967 the people of Montana were infinitely more aware and concerned with the development of a vocational education system in their state than had been the case prior to this time. On this the interviewer could find no one who dissented.

In conclusion it might be noted that Montana obviously has the least developed of the vocational systems studied. Two, both political and administrative barriers have stood in the way of developing such a system until recently. Three, the presences of federal legislation beginning with the Act of 1963 has, without question, peaked the interest and the imagination of the people in this state as shown concerned with questions of finance from federal and state sources beginning in the summer of 1967. It seems clear that in the next year or two some significant recommendations concerning the direction of vocational education in the state of Montana should be forthcoming. At this juncture, political consideration concerning questions as to where such area vocational schools might be located seems to be uppermost in the minds of most of the people of the state.

V. CONCLUSIONS AND IMPLICATIONS

One, the Federal Vocational Education Act of 1963 appears to have had a more meaningful bearing upon the vocational technical school systems in non-metropolitan areas than the amount of federal funds expended would seem to suggest. This is reflected in the growth of state law, state administrative rules, the authorization in state administrative structuring, and in overall planning inputs on the part of state policy-makers. Two, there is some evidence in this study to suggest a close correlation between the age and scale of a state vocational system and the number and variety of industrial and technical job openings available within the state.

Conversely the more rural, agriculturally oriented a state remains, barring outside inducements such as the Federal Act of 1963, the less likelihood there is for a diverse and systematic vocational technical education program existing or being developed. This presumes, of course, that the states studied have a basic element of similarity insofar as they are typical of other non-metropolitan states in the Union.

The four states (Iowa, Wisconsin, Montana, and Louisiana) were chosen out of the sample which included, in addition to these four, the states of Oregon, Idaho, Wyoming, Nebraska, Kansas, Oklahoma, Minnesota, Indiana, Tennessee, Alabama, Georgia, Virginia, New Hampshire and Maine. Three, it seems that Wisconsin's administrative pattern for its vocational educational system, which was the first to be established in the United States and which provides for a high degree of autonomy and local fiscal independence, had not been followed in the non-metropolitan states studied or in many of the other states which were viewed in somewhat less detail. On the contrary, the approach of the other states has been toward creating a highly centralized system or as has been that of Iowa, and to some extent Montana, where the trend seems to be in the direction of following a regional approach with fiscal support coming from both state, local and in some instances the national government.

Four, unfortunately the period for which this project was funded was not long enough to make the on-going, in-depth analysis which would be of special significance in those non-metropolitan states such as Iowa and Montana where vocational technical school systems are just beginning to emerge, primarily, it would appear, because of the enactment of the Federal Vocational Education Act of 1963 and 1965. Additional research is essential to fully understand the growing pains of the new system which of course, in itself creates an important new governmental function.

Five, this study strongly suggests that in the field of at least the vocational-technical education, the statute law and administrative rules reflect the political constraints and pressures affecting the educational system of that state. Where there was a true value commitment toward vocational education, as there has been for a long time in both Wisconsin, and for a somewhat shorter time period in Louisiana, this was reflected in, if nothing else, a notably greater bulk of laws and regulations, in addition, of course, to significant appropriations allocated to such schools.

VI. SUMMARY

As has been pointed out, decision making in the field of education requires a sharp-eyed awareness of the systemic quality of the processes developing and controlling a governmental function.

To be most useful to the decision makers, vocational education policy research was directed toward such questions as how governmental resources are allocated and the manner in which they are allocated. Given the national legislative goal of expanding vocational education, national policymakers particularly wish to know and understand elements inhibiting and encouraging the development of vocational programs locally to maximize support for vocational education programs.

In essence, then, one of the primary concerns of this study was to attempt to evaluate and analyze the system in which vocational education operates, thereby affecting and being affected by the overall political, economic, and social constraints of American society.

Of the 18 non-metropolitan states studied four were chosen as having sizeable rural populations. These were: Iowa, Wisconsin, Louisiana, and Montana. These four were selected because they differed in important respects, particularly the different types of existing vocational programs and the degree in which they obligated themselves, financially, to vocational education. In approaching the analysis of the states of Iowa, Wisconsin, Louisiana and Montana, the initial institutional focus was upon state law and the legislative process. This assumed that the legislatures are to some degree central and instrumental in shaping vocational educational policies of the state.

Nonetheless, it is important to recognize that administrative agencies such as state boards of public instruction and state vocational education boards frequently can, through direct and indirect means, alter, develop and affect educational policy in the field of vocational education.

This is but to say there are various ways of looking at a governmental function such as vocational education. One may observe the constitutions and laws governing and establishing such a system. Second, one may look at the way in which governmental function is, in fact, administered. This may or may not correspond to the intent and the spirit of the constitution and the laws. Three, one may look at the overall political, economic and social system in which particular functions operate to see why in fact, the governmental function is affected by and affects the overall system.

In an attempt to develop a systematic methodological overview for purposes of visualizing this essential interrelationship and to encourage further conceptualizati[illegible] regarding the fundamental relationship, Figure I was developed as a model and should be regarded as merely a starting point.

The statute law and administrative rules of the four states studied in depth ranged from the highly detailed and codified statute law of Wisconsin to the almost non-existent statutory provisos of Montana. Wisconsin and Louisiana have the oldest and most extensive vocational school systems of the states studied, but Louisiana law is less detailed in spelling out the structural side of the administrative system. This is perhaps traceable to the fact that financial support for the schools comes almost entirely from the state and is administered from the state level also. In the case of Wisconsin, fiscal independence was given to the local school boards and this, coupled with the high degree of local and administrative autonomy, accounts for the detailed statutory constraints. This is consistent with most patterns of local governmental law where Dillon's rule prevails. This, of course, is the judicial doctrine of long standing which stipulates that a local governmental agency may do only those things specifically authorized to it by state law.

In an earlier study the Iowa administrative structure was described for the area vocational schools of that state. It will be remembered that these schools are direct entities of the state responsible to the state department of public instruction and to no other governmental entity in the strict legal sense. They are units that are superimposed over the local county school units and do not replace or consolidate any existing school divisions including the state's 16 junior colleges. Since the report of a year ago, in Iowa, problems have arisen of a financial sort but they also concern the alleged malapportionment of representation on the boards. Also, considerable debate is currently swirling around the fundamental question of whether there exists an adequate tax base in the state to retain all of the proposed area vocational technical schools, particularly if their programs are tied in some fashion to the junior colleges.

From the standpoint of the effects of partisan politics upon the vocational school system, there seems no question in this investigator's mind that politics plays an infinitely greater role in the vocational and technical school systems of Montana and Louisiana than it does in the state of Iowa and Wisconsin. In the latter two states, the analyst was to encounter no instances of significant partisan intrusion into the policy making or administrative sides of these programs. Various local or regional rivalries were indicated in Iowa, but even these were not apparent in Wisconsin. In the case of Wisconsin this may be traceable to the universality rather than the regional nature of the vocational technical school system. Montana, while just becoming aware of the potential of vocational education programs under federal sponsorship and also the favorable effects of area vocational schools to the city in which such a school is located, was in the summer and fall of 1967 gearing itself for a major battle over the location of these schools. The schools in Louisiana from all indications developed on an individual basis traceable to, in part, the influence of local legislators within the state legislature as a whole.

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TITLE An Analysis of Legal and Political Problems and the Strategy Necessary for Implementing Programs Under the Vocational Education Act of 1963 (refer to field #12)
Final Report (11/66 - 6/68)

PERSONAL AUTHOR(S) Donald E. Boles

INSTITUTION (SOURCE) Iowa State University, Ames, Iowa 50010

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IDENTIFIERS

ABSTRACT One, a model was developed seeking to demonstrate the systemic interrelationship of vocational educational programs to the political, economic and social forces at work in a state or community. Two, Iowa, Montana, Louisiana and Wisconsin were selected for study as states with sizable rural or non-metropolitan populations where vocational education programs differ significantly both as to structure and as to type and degree of commitment to financing. Three, in-depth analysis of the statutes and administrative rules of the four states was completed. Four, interviews were conducted with key educational administrators, legislators, and legislative research bureau directors who deal regularly with the private-group and public forces at work in shaping a vocational education system. Five, in conjunction with another project, a paper titled "The Effects of Governmental Structure and Administration Upon Public Education Systems" was prepared by Donald E. Boles. It is expected that it will appear as a chapter in a book to be published in the near future. Six, as something of a sidelight, but relying in part on information acquired during the course of this project a paper was completed and presented at the Iowa Conference of Political Scientists meeting April 20, 1968. It is titled, "The Courts, Religion and Education: The Slippery Wall of Separation". A significant portion dealt with federal educational laws enacted within the last decade which permit the use of public funds for private and parochial schools and the resulting problems and litigation. Seven, from interviews and other research it seems apparent that there are sharply divided opinions among policymakers and school administrators concerning the educational theory of a man who is entrusted to direct and develop the main thrust of a state's vocational educational programs.

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COLLECTION OF OCCUPATIONAL DATA BY SKILL CLUSTERS USING A SAMPLING TECHNIQUE

Project No. 8
Contract O. E. 5-85-108

From Material Submitted by

Trevor G. Howe
Robert W. Thomas
James J. Mikesell

As Edited by

Robert W. Thomas

June 1968

The research reported herein was performed pursuant to a contract with the Office of Education, U.S. Department of Health, Education, and Welfare. Contractors undertaking such projects under Government sponsorship are encouraged to express freely their professional judgment in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Office of Education position or policy.

Iowa State University of Science and Technology

Ames, Iowa
50010

TABLE OF CONTENTS

		Page
I.	INTRODUCTION	H-1
II.	METHOD	H-5
III.	RESULTS	H-15
IV.	DISCUSSION	H-22
V.	CONCLUSIONS	H-31
VI.	SUMMARY	H-42
VII.	REFERENCES	H-44
VIII.	APPENDIX	H-47

I. INTRODUCTION

A. Problem

Technological progress and lack of co-ordinated plans for human resource development have resulted in critical discrepancies between supply and demand for workers with specific occupational skills. Examples of emergency legislation to cope with the problems of unemployed and unskilled labor are the Manpower Development and Training Act of 1962, Vocational Education Act of 1963, and the Economic Opportunity Act of 1964. These and other forms of legislation have attempted to alleviate the problems of the unskilled and untrained manpower, as well as unemployment.

The Area School Act, Senate File 550, passed by the Sixty-First Iowa General Assembly, became law on July 4, 1965. This act provided for the establishment and operation of area vocational school and area community colleges. The rapid progress and state-wide implementation of this permissive legislation is clear evidence of the local support and recognition of the need for greatly expanded occupational and educational opportunities for all Iowans.

There is an imperative need in the State of Iowa for current occupational information which can be used in making decisions and planning for occupational curricula. The increased emphasis on the need for new and expanding vocational-technical education and the advent of area schools in Iowa have brought to the forefront a series of crucial unrelated factors for which educators must have answers as they go about a task of allocating resources and developing programs.

Many broad factors or variables such as inter-state and intra-state migration, military draft, new industry development, defense contracts and construction, federal legislation and state and federal aid to education have caused rapid changes in the demand for and scarcity of trained labor. Other related factors include occupational obsolence, upward mobility, and need for upgrading, for advancement, and the necessary "lag time" needed for training between recognition of need and placing trained workers in jobs.

Appropriate occupational information needed to justify educational program decisions is not adequately available. This is a critical problem. Its solution should have high priority because of the implications to educational program planning. Available occupational data from census material are too general and collected too infrequently. Similarly, data from the Iowa Employment security commission provides occupational information by industries, not by skill classification.

This research was prompted by reviewing various survey results obtained by using mailed questionnaires. Because of the inadequacies in communications and nonresponse, many of these resulted in a series of shortcomings that did not provide sufficient and useable information. After considering several alternative courses of action, the decision was made to conduct a pilot occupational skill survey on a sampling basis, using personal interviews.

Examination of available occupational information revealed some critical shortages of trained workers in Iowa metal working industries. A series of meetings with the Employment Securities Commission, the Director of Research Coordinating Unit, and others lead to the decision to proceed with the survey. This study, partially supported by a federal grant from the U.S. Office of Education, has the support and cooperation of the Vocational Education Branch of the Department of Public Instruction, the Iowa Manufacturers Association, and the Iowa Development Commission.

The major problem was the development of procedures or techniques for the periodic collection and maintenance of up-to-date occupational data responsive to changing conditions.

B. Purpose

The purpose of this project is twofold:

1. To collect current occupational information on job vacancies by using sampling techniques
2. To develop skill cluster classifications for occupations designed to aid in curriculum development for the teaching of similar competencies.

C. Objectives

The objectives of the project are as follows:

1. To define selected occupational skill clusters in the metal working area
2. To determine the industries comprising the population from which the sample will be drawn
3. To develop a technique for drawing a sample from the population defined
4. To develop an instrument for collection of the occupational data
5. To interview the sample of selected industries

6. To tabulate and analyze the results and make job projections

7. To disseminate the information generated to planners of curricula and programs for vocational and technical schools and to cooperating agencies and industries

D. Review of Related Research

The cluster concept is aimed at development of skills and understandings related to allied fields. It is postulated that clusters of skills such as the ability to work simple algebra problems or the ability to read meters can be identified with corresponding clusters of jobs which demand these skills as prerequisites.

The skills associated with a specific occupation may be identified in three groups. If a certain set of skills, say skills "h", is the minimum level of skills required to perform job "h", then this bundle of skills can be broken further into its components, such as physical and mental capabilities, skills which are developed on the job, or skills which can be taught to an individual but are not received on the job.

These ideas have been developed to some extent by Wilson H. Elkins in a project proposal submitted to the U.S. Office of Education.

The importance of skill clusters lies in the separation of skills into groups with emphasis on identification of the specific skills or specific set of skills so facilities of public education can be used most effectively to prepare individuals. The identification of the minimum skill levels is the first specific set of skills which may limit the entry of someone into the job market. Individuals should attempt to acquire these skills first, for the inability to meet physical and basic mental requirements eliminates one quickly. Minimum levels of skills are next in importance in directing educational programs. Separation of these from complex skills enables pre-job education to be clearer and more direct in these more limited channels.

Next, one can identify a new group of skills which is the concern of educators trying to identify basic skills which an educational system can teach. These might be the minimum "basics" of mental and physical capability.

Emphasizing the cluster concept improves allocation of educational resources by setting priorities of importance based on present and future job markets.

Teaching basic skills in these clusters also has as a principle objective: that of preparing an individual for a broader job market than if he prepared himself only in obtaining skills often obtained on the job.

A more general education, which is not a prerequisite for job entry is a possible "companion-piece" of training, and may be a part of a job cluster.

Increased job mobility is the most generally stated reason for the importance of identification of job clusters. The increase in educational efficiency also ranks high, both in terms of allocation of educational resources and in terms of directing students' efforts.

Another importance of the skill clusters concept is said to be that it emphasizes more basic training and leads to a lessening of job obsolescence.

A study of interest is "A Factor Analytical Approach to Job Finding," Psychological Bulletin, by C. H. Coombs. This is a factor-analysis study. A number of occupations were broken down into "job elements." The elements were given a one or two weight according to their importance. An additional weight, from one to three was added according to the relative proportion of that particular element in the total occupation. The two weights were multiplied to give an overall weight. Occupations were then grouped according to common levels of element.

Joseph P. Arnold in "A Study of Recommendations for Technical Education Curricula," (Project S-196, U.S.O.E., December, 1965) reviews a study made of a selected sample of 52 industries in Illinois. Technicians and the next three levels of management were interviewed for certain technicians' jobs where the job content and courses considered in terms of relatedness to the job were determined. A deck of 99 cards describing different course contents were sorted by the respondents into one of three piles relative to their relatedness to the technician's job. A "general core" of subjects was identified which were common to all jobs. "Individual cores" were also identified which were more specific to individual job families.

The results of the study show that most technician jobs are hybrids over what might generally be assumed to compose a technical occupation.

It appears that the researchers may have used some preconception of relatedness of jobs in establishing their "job families." There is no attempt to differentiate skills which are inherent or best learned on the job from those which should be contained in technical curricula.

N. R. Frantz has studied the cluster concept as a program in vocational education at the secondary school level. For him the cluster concept is aimed at setting up vocational education programs at the secondary school level. The skill cluster program will allow geographical and occupational mobility and equip people to adapt to technological changes. Interviews showed: (1) that school administrators saw the cluster concept as feasible and easily implemented in the secondary schools, and (2) that employers indicated they would hire cluster educated people and specialize them with on-the-job training and apprentice programs. Occupational divisions of the old Dictionary of Occupational Tables were found not appropriate. Factor analysis was rejected as an analytical technique, as was a hierarchial clustering technique in favor of a procedure with a "human engineering concept." Tasks were identified by: (1) a verb of behavior, (2) a noun describing the object of the action, and (3) an adverb or adjective describing the result of the action.

This appears to be an operational system, but the present writing lacks detail. Probably factor analysis would have been a useful tool.

II. METHOD

A. Need

Because there is a crucial need for up-to-date occupational data for the planning and development of vocational and technical programs especially in Iowa's new area vocational-technical schools, an occupational skill survey was undertaken for Iowa metalworking industries. A report on manpower and training needs has been secured through a sample of manufacturing concerns from 558 firms classified under Standard Industrial Classifications 33, 34, and 35.

B. Survey

The survey was conducted by the Education Department and Statistical Laboratory at Iowa State University. Cooperating in the survey were staff of the Division of Vocational Education in the State Department of Public Instruction for the state of Iowa, and staff of the Department of Economics, Iowa State University.

C. Sample

This study first collected current occupational information by using a sampling technique. A schedule was designed to collect and record employment data on selected occupations. By means of a personal interview each company coming into the sample was contacted and occupational data were recorded. At this point one wants to note that published materials will be released in such a manner that the data relating to individual companies cannot be identified. The information then will be disseminated to educational planners, to manufacturers, and to other concerned citizens.

Since complete census data are available only on 1960 figures, these are not recent enough for present planning. Further, the Iowa Employment Security Commission presently collects information by industry and not by occupations. Detailed and specific data on occupations are needed. Many factors or variables such as inter-state and intra-state migration, military draft, new industrial development, defense contracts and construction, federal legislation, and state and federal aid to education have caused rapid changes in the demand for, and scarcity of, trained labor.

The present major problem is the development of procedures for periodic collection and maintenance of up-to-date occupational data responsive to changing conditions. The method of sampling used in this study is designed to conquer this procedural problem.

The Iowa manufacturing population was defined and limited to 558 Iowa manufacturing concerns. These industries were primarily engaged in metal fabrication and manufacturing. They were found listed in the Standard Industrial Classifications of 33, 34, and 35.

The Iowa Research Coordinating Unit, the Iowa Employment Security Commission and the Iowa Development Commission assisted with project planning. A magnetic tape was provided on a loan basis by the Iowa Development Commission. The tape contained a limited amount of up-to-date information about the manufacturing concerns being studied. Firms classified in Standard Industrial Classifications 33, 34, and 35 were included in print-outs and defined as the population to be examined. Additional information which was also taken from the tape included: (1) the number of employees in each firm, (2) the firm name, and (3) the firm's address.

The Statistical Laboratory and Computational Center of Iowa State University have been project advisors and have been providing services. They drew the sample of firms. The companies were classified according to frequency intervals corresponding to the numbers of employees. Data have been collected from all the firms employing over 100 employees. Representative random samples have been drawn of those companies employing less than 100 employees.

This study builds on an earlier questionnaire mailed to all Iowa manufacturing concerns by the Center for Industrial Relations at Iowa State University. Critical worker shortages were noted, particularly in the metal occupations. Since this area appeared to be one of major concern in developing programs for area schools in Iowa, the current study with its carefully-designed sample was undertaken.

For occupational skill clusters from defined populations researchers decided to rely heavily on the third edition of Dictionary of Occupation Titles for Occupational Classification.

The sample included Iowa firms in the following Standard Industrial Classifications: (1) S.I.C.: 33, primary metal industries, (2) S.I.C.:34, metal fabrication, excepting ordinance, and (3) S.I.C.:35, machinery, excepting electrical. Within these three classifications, the sample was drawn from 558 Iowa firms which were grouped by numbers of employees. The grouping and coding are as shown in table one.

TABLE 1. IOWA MANUFACTURING CONCERNS BY SELECTED STANDARD INDUSTRIAL CLASSIFICATIONS

S.I.C. \ Size Code		A(1-20)	B(21-50)	C(51-99)	C(100-	E	F	G	Total
Primary Metal	33	17	8	5	14	5	1	1	51
Fab. Metal Products	34	165	55	18	26	5	3	1	273
Machinery Except Elec.	35	139	24	23	25	10	4	9	234
TOTAL		321	87	46	65	20	8	11	558

D. Interview

The interview schedule shown in the Appendix was designed to collect and record employment data from each company on selected occupations. The method used was a personal interview. The Handbook on Employment Security Job Market Research Methods - Area Skill Survey, BES No. E-252, November, 1965, was a helpful reference.

The information gathered has been treated as confidential and will not be revealed to anyone. It will be coded and processed electronically. This will insure anonymity. Published material will be released in such a manner that data relating to individual companies cannot be identified.

The estimated average time required from the respondent varied from one hour per interview to twelve hours per interview for larger companies with several hundred employees.

Since care was taken to secure cooperation of affected parties as well as parties interested in the information, the business units contacted were generally very helpful. Cooperation of each firm to be interviewed was solicited by letter (see the Appendix for letters). Enclosures with the letter to the firm showed that leading Iowa agencies were also interested in the success of the project.

Skilled, professional interviewers were hired to contact the firms. These ladies had copies of the letters which could be used to remind the interviewee of a previous contact.

The ladies doing the interviewing came to the campus of Iowa State University for intensive training in the details of this particular survey. The interviewer's instructional guide is shown in the Appendix.

The instrument used by the interviewers for data gathering is the first item in the Appendix. These occupational skill survey sheets are shown as part I, "Employer Data Sheet," and part II, "Occupational Employment Data Sheet." Part I gives information about the plant, together with its geographic location within the state of Iowa. Part II gives information regarding the workers. In this part the interviewers recorded detailed information relative to job training and levels of work difficulty.

To assist researchers in classification of the job and its level of difficulty, the interviewers were requested to use appropriate codings from The Dictionary of Occupational Titles: Volume II, Occupational Classification (Third Edition), published in 1965. Printed sheets supplied to the interviewers gave appropriate occupational descriptions selected for each of the three Standard Industrial Classifications used in the survey. The three-digit occupational code was given opposite each job title. Also provided on separate cards were the three digits which indicate level of task difficulty under the three headings of data, people, and things. The printed sheets and cards supplied to interviewers are included in the Appendix. A typical entry would be 523.104, where 523 would be the occupational classification; 1, the level of difficulty relative to data; 0, the level of difficulty relative to people, and 4 the level of difficulty relative to things.

This occupational skill survey sampled firms and occupations in the metal trades in Iowa as identified by three Standard Industrial Classifications. The three categories were: (1) primary metal, 33; (2) fabricated metal products, 34; and (3) machinery except electrical, 35. Because of the large number of very small firms, the four larger-sized factory groups received most of the attention. Concentration on these larger firms allowed inclusion of a larger number of the total employees. It also allowed better separation of occupations.

The survey included 70 different occupations in the metal trades as identified by the third edition of The Dictionary of Occupational Titles (DOT). The occupations were grouped more generally into such aggregates as foundry worker, machine trades, and metal working.

The survey asked the firm's present level of employment and the expected levels one year and three years hence. The survey reports present and projected employment levels in each of the 70 occupations, present vacancies, and the difficulty in filling job vacancies. Also reported is the skill level and department in which the job falls.

Educational requirements for entry are also given whether such training is achieved on the job or in a vocational training school.

All sampled units were drawn from three lists representing all Iowa firms in the Standard Industrial Classifications (S.I.C.'s) of 33, 34, and 35. Within each S.I.C. list firms are grouped by one of seven size classifications with the smallest size group at the first of the list and progressing to the largest size group at the list's end. The size groups (as classified by total employment) are: A = 1 to 20 employees to the firm; B = 21 to 50; C = 51 to 100; D = 101 to 250; E = 251 - 500; F = 501 - 1000 employees, and G = 1001 or more employees to the firm. All firms are identified by another two digit breakdown in addition to the first two digits of 33, 34, or 35 which designate more broadly-defined industries. Within the size group listings, firms are roughly organized by this final two digit breakdown (as all firms in a given list already have the same first two digits). The population of size A firms was sampled systematically at a one-in-four rate. The A firms in S.I.C.'s 33, 34, and 35 were combined in that order to form one list. A starting point was randomly selected from the first four entries of S.I.C. 33 and every fourth firm thereafter entered the sample as drawn. The population of size B and C firms was sampled systematically at a one-in-three rate. As with the A size firms, a combined list for firms from all three S.I.C.'s was made by forming a sequence of groups of the form: (1) S.I.C. 33, Size B; (2) S.I.C. 33, Size C; (3) S.I.C. 34, Size B; and so on to (6) S.I.C. 35, Size C. A starting point was randomly selected from the first five units. That unit and the next two entered the sample. Then two were skipped. The next three entered the sample. This procedure was continued until all units had a chance to enter the sample. All firms in the size groups D, E, F, and G were in the sample on a one-in-one basis.

Table two represents: (1) the population, (2) the sample which was drawn, and (3) the reasons interviews were not completed. An interview may not have been completed because the sampled unit was not a member of the population under study. In this case an adjustment in the total population was in order. The assumption was made that non-eligibles exit at the same rate in the sample and the population. Thus the population size was adjusted downward.

An interview may also not have been completed, when eligible, because the interview was refused, or a time to take the interview

TABLE 2 - JOB SKILLS
POPULATION, SAMPLE, AND INTERVIEW RESULTS

	Number on List			Number Drawn			Number Interviewed	Refusals	Not Eligible	Quit or Moved	Jackup
	SIC 33	SIC 34	SIC 35	SIC 33	SIC 34	SIC 35					
	17	164	139	5	41	35	59	3	6	13	4.15
SIZE A		320			81						
	8	54	24	5	33	15	48	0	4	1	1.62
SIZE B		86			53						
	5	18	23	3	10	4	24	3	0	0	1.83
SIZE C		46			27						
	14	26	25	14	26	25	56	8	1	0	1.14
SIZE D		65			65						
	5	5	10	5	5	10	19	1	0	0	1.05
SIZE E		20			20						
	1	3	4	1	3	4	7	1	0	0	1.14
SIZE F		8			8						
	1	1	9	1	1	9	11	0	0	0	1.00
SIZE G		11			11						
TOTAL	51	271	234	34	119	112					
		556			265						

could not be arranged. In this case, noninterviewed firms were assumed to have the same characteristics as the average interviewed firm and adjustments were made accordingly.

For aggregation of quantitative data, adjustment weights were calculated by the formula (where "J" is the adjusted weight):

$$J = \frac{(P_D)\ (S_E)}{(S_D)\ (S_C)};$$

where:

P_D = size of population from which sample is drawn
S_D = size of original sample drawn
S_E = size of original sample minus non-eligibles
S_C = number of completed interviews
J = "jackup" rate or adjustment weight

Separate "jackup" rates were calculated for each of the seven size groups. These rates were multiplied by the employment information for individual firms before their aggregation into estimates of population information.

The occupations used in this study were identified by the first three digits as previously explained (and as seen in the Appendix). However, three more digits were used, appearing after a decimal point (i.e., 500.111). These last three digits explain relationships within data, people, and things hierarchies. Explanations from The Dictionary of Occupation Titles, (3rd Edition), pp. 649-650, are now given.

Much of the information in the new Dictionary of Occupational Titles was based on the premise that every job requires a worker to function in relation to data, people, and things, in varying degrees. These relationships are identified and explained below. They appear in the form of three hierarchies arranged in each instance from the relatively simple to the complex in such a manner that each successive relationship includes those that are simpler and excludes the more complex. The identifications attached to these relationships are referred to as worker functions, and provide terminology for use in summarizing what a worker does on the job.

TABLE 3. DATA (4TH DIGIT)

Code	Category
0	Synthesizing
1	Coordinating
2	Analyzing
3	Compiling
4	Computing
5	Copying
6	Comparing
7)	No significant relationship
8)	

TABLE 4. PEOPLE (5TH DIGIT)

Code	Category
0	Mentoring
1	Negotiating
2	Instructing
3	Supervising
4	Diverting
5	Persuading
6	Speaking-Signaling
7	Serving
8	No significant relationship

TABLE 5. THINGS (6TH DIGIT)

Code	Category
0	Setting-Up
1	Precision Working
2	Operating-Controlling
3	Driving-Operating
4	Manipulating
5	Tending
6	Feeding-Offbearing
7	Handling
8	No significant relationship

The meanings are as follows:

1. Data: Information, knowledge, and conceptions, related to data, people, or things, obtained by observation, investigation, interpretation, visualization, mental creation; incapable of being touched; written data take the form of numbers, words, symbols; other data are ideas, concepts, oral verbalization.

2. Code for data:
   0 Synthesizing: Integrating analyses of data to discover facts and/or develop knowledge concepts or interpretations.
   1 Coordinating: Determining time, place, and sequence of operations or action to be taken on the basis of analysis of data; executing determinations and/or reporting on events.
   2 Analyzing: Examining and evaluating data. Presenting alternative actions in relation to the evaluation is frequently involved.
   3 Compiling: Gathering, collating, or classifying information about data, people, or things. Reporting and/or carrying out a prescribed action in relation to the information is frequently involved.

4 Computing: Performing arithmetic operations and reporting on and/or carrying out a prescribed action in relation to them. Does not include counting.
5 Copying: Transcribing, entering, or posting data.
6 Comparing: Judging the readily observable functional, structural, or compositional characteristics (whether similar to or divergent from obvious standards) of data, people, or things.

3. People: Human beings; also animals dealt with on an individual basis as if they were human.

4. Code for people:
0 Mentoring: Dealing with individuals in terms of their total personality in order to advise, counsel, and/or guide them with regard to problems that may be resolved by legal, scientific, clinical, spiritual, and/or other professional principles.
1 Negotiating: Exchanging ideas, information, and opinions with others to formulate policies and programs and/or arrive jointly at decisions, conclusions, or solutions.
2 Instructing: Teaching subject matter to others, or training others (including animals) through explanation, demonstration, and supervised practice; or making recommendations on the basis of technical disciplines.
3 Supervising: Determining or interpreting work procedures for a group of workers, assigning specific duties to them, maintaining harmonious relations among them, and promoting efficiency.
4 Diverting: Amusing others.
5 Persuading: Influencing others in favor of a product, service, or point of view.
6 Speaking-Signaling: Talking with and/or signaling people to convey or exchange information. Includes giving assignments and/or directions to helpers or assistants.
7 Serving: Attending to the needs or requests of people or animals or the expressed or implicit wishes of people. Immediate response is involved.

5. Things: Inanimate objects as distinguished from human beings; substances or materials; machines, tools, equipment; products. A thing is tangible and has shape, form, and other physical characteristics.

6. Code for things:

0 Setting Up: Adjusting machines or equipment by replacing or altering tools, jigs, fixtures, and attachments to prepare them to perform their functions, change their performance, or restore their proper functioning if they break down. Workers who set up one or a number of machines for other workers or who set up and personally operate a variety of machines are included here.

1 Precision Working: Using body members and/or tools or work aids to work, move, guide, or place objects or materials in situations where ultimate responsibility for the attainment of standards occurs and selection of appropriate tools, objects, or materials, and the adjustment of the tool to the task require exercise of considerable judgment.

2 Operating-Controlling: Starting, stopping, controlling, and adjusting the progress of machines or equipment designed to fabricate and/or process objects or materials. Operating machines involves setting up the machine and adjusting the machine or material as the work progresses. Controlling equipment involves observinggages, dials, etc., and turning valves and other devices to control such factors as temperature, pressure, flow of liquids, speed of pumps, and reactions of materials. Setup involves several variables and adjustment is more frequent than in tending.

3 Driving-Operating: Starting, stopping, and controlling the actions of machines or equipment for which a course must be steered, or which must be guided, in order to fabricate, process, and/or move things or people. Involves such activities as observing gages and dials; estimating distances and determining speed and direction of other objects; turning cranks and wheels; pushing clutches or brakes; and pushing or pulling gear lifts or levers. Includes such machines as cranes, conveyor systems, tractors, furnace charging machines, paving machines and hoisting machines. Excludes manually powered machines, such as handtrucks and dollies, and power assisted machines, such as electric wheelbarrows and handtrucks.

4 Manipulating: Using body members, tools, or special devices to work, move, guide, or place objects or materials. Involves some latitude for judgment with regard to precision attained and selecting appropriate tool, object, or material, although this is readily manifest.

5 Tending: Starting, stopping, and observing the functioning of machines and equipment. Involves

adjusting materials or controls of the machine, such as changing guides, adjusting timers and temperature gages, turning valves to allow flow of materials, and flipping switches in response to lights. Little judgment is involved in making these adjustments.

6 Feeding-Offbearing: Inserting, throwing, dumping, or placing materials in or removing them from machines or equipment which are automatic or tended or operated by other workers.

7 Handling: Using body members, handtools, and/or special devices to work, move, or carry objects or materials. Involves little or no latitude for judgment with regard to attainment of standards or in selecting appropriate tool, object, or material.

After acquiring data as described in this section, these data entries received from interviewers had to be coded for key-punch operators so that data cards based on information received in questionnaires could be generated for tabulating, analysis, and later correlating. These data were coded after the fashion shown in the Appendix, "Data Code Sheets."

III. RESULTS

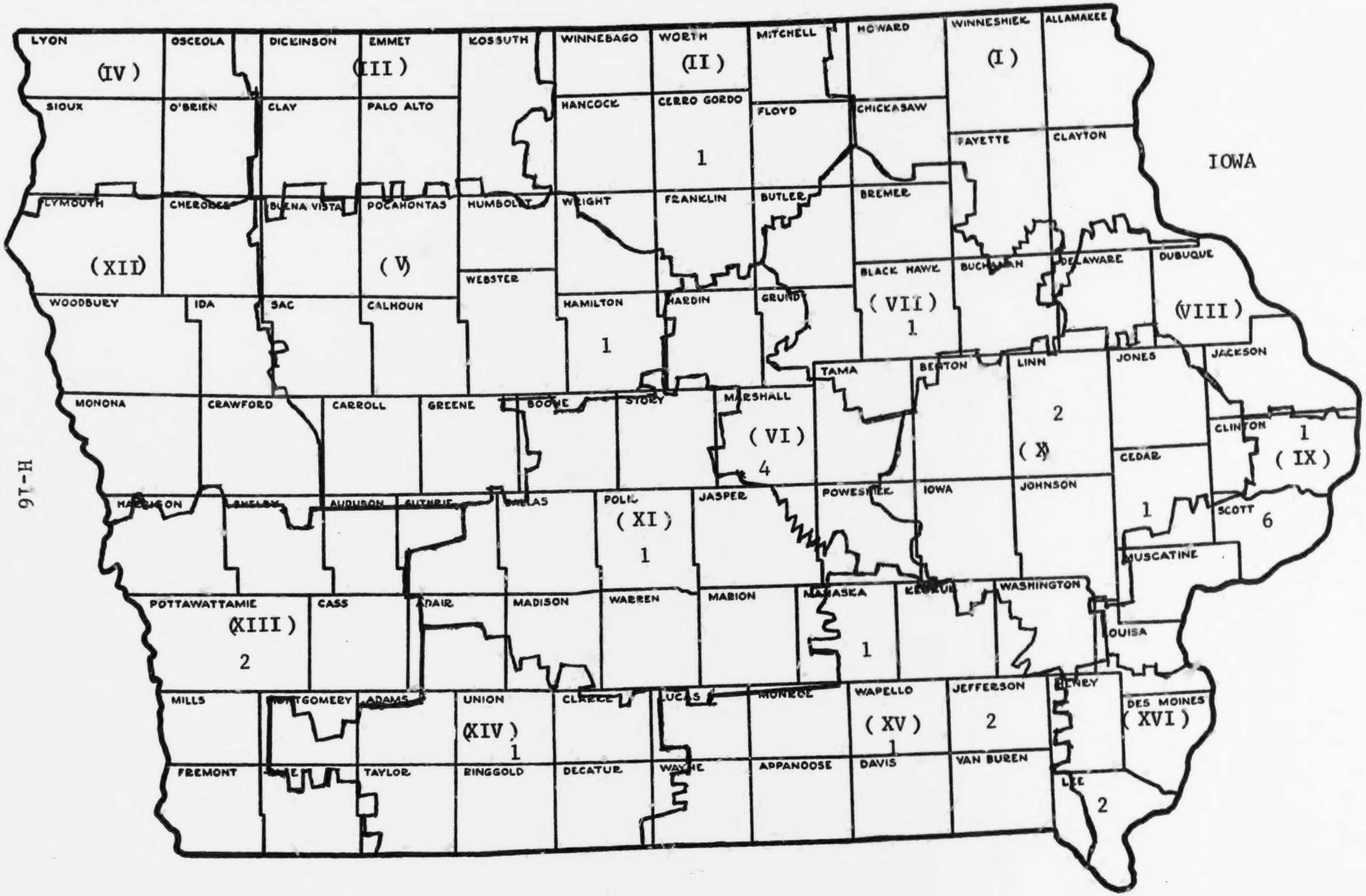
Results reported are for a continuing study, and hence are tentative.

Tables and figures which display, analyze and illustrate the sample technique, the type of occupational data collected, and the relation to skill clusters is examined.

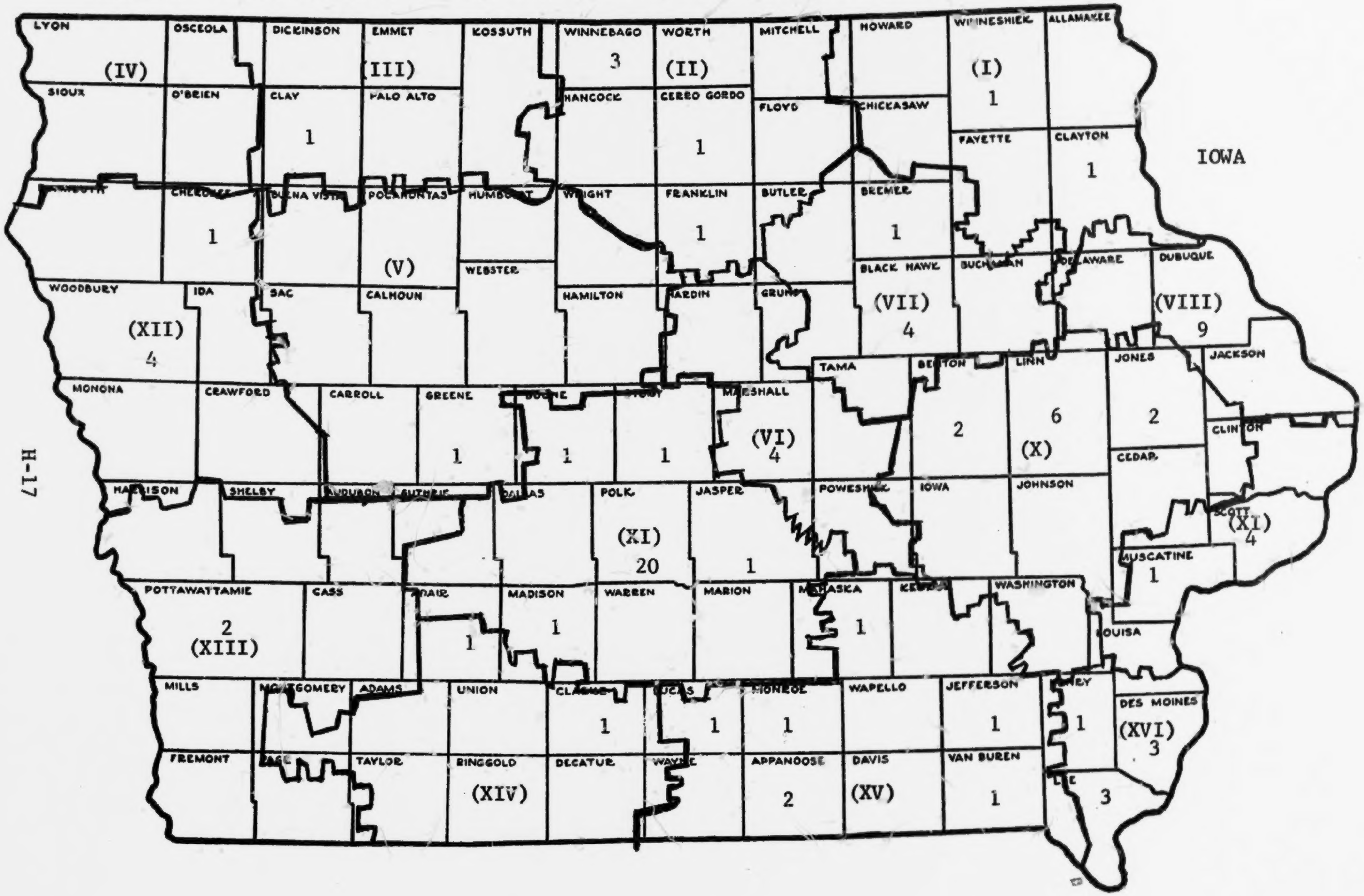
For this study, figures one, two, and three show geographic dispersion of Iowa firms drawn into the sample. Figure one shows location of 27 Iowa firms in Standard Industrial Classification 33. Figure two locates the 92 Iowa firms in Standard Industrial Classification 34. Figure three for Standard Industrial Classification 35 maps the 105 Iowa firms from this category which appeared in the sample.

Tables six, seven, and eight give for each size grouping, location of firms by areas. These areas are the sixteen shown on Iowa maps in figures one, two, and three. For each of the Standard Industrial Classifications (33, 34, 35) for the sample of Iowa firms, area numbers and a size code are given. The letters (with numbers in parentheses) show the number of full time workers for plants in that size group. The size groups are given as rows in these tables, and the area numbers are the columns.

FIGURE 1 - GEOGRAPHIC DISTRIBUTION OF SAMPLED IOWA FIRMS IN STANDARD INDUSTRIAL CLASSIFICATION 33


IOWA
LYON
OSCEOLA
DICKINSON
EMMET
KOSSUTH
WINNEBAGO
WORTH
MITCHELL
HOWARD
WINNESHIEK
ALLAMAKEE
(IV)
(III)
(II)
(I)
SIOUX
O'BRIEN
CLAY
PALO ALTO
HANCOCK
CERRO GORDO
FLOYD
CHICKASAW
FAYETTE
CLAYTON
1
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
BUTLER
BREMER
(XII)
(V)
WEBSTER
BLACK HAWK
BUCHANAN
DELAWARE
DUBUQUE
WOODBURY
IDA
SAC
CALHOUN
HAMILTON
HARDIN
GRUNDY
(VII)
1
(VIII)
1
TAMA
BENTON
LINN
JONES
JACKSON
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
STORY
MARSHALL
(VI)
4
2
(X)
CLINTON
1
(IX)
CEDAR
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
(XI)
1
JASPER
POWESHIEK
IOWA
JOHNSON
1
SCOTT
6
MUSCATINE
POTTAWATTAMIE
(XIII)
2
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA
KEOKUK
WASHINGTON
1
LOUISA
MILLS
MONTGOMERY
ADAMS
UNION
(XIV)
1
CLARKE
LUCAS
MONROE
WAPELLO
(XV)
1
JEFFERSON
2
HENRY
DES MOINES
(XVI)
FREMONT
PAGE
TAYLOR
RINGGOLD
DECATUR
WAYNE
APPANOOSE
DAVIS
VAN BUREN
LEE
2

GEOGRAPHIC
FIGURE 2 - DISTRIBUTION OF SAMPLED IOWA FIRMS IN STANDARD INDUSTRIAL CLASSIFICATION 34


IOWA
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WINNEBAGO
WORTH
MITCHELL
HOWARD
WINNESHIEK
ALLAMAKEE
(IV)
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(II)
(I)
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SIOUX
O'BRIEN
CLAY
PALO ALTO
HANCOCK
CERRO GORDO
FLOYD
CHICKASAW
FAYETTE
CLAYTON
1
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1
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
BUTLER
BREMER
1
1
1
(V)
WEBSTER
BLACK HAWK
BUCHANAN
DELAWARE
DUBUQUE
WOODBURY
IDA
SAC
CALHOUN
HAMILTON
HARDIN
GRUNDY
(XII)
4
(VII)
4
(VIII)
9
TAMA
BENTON
LINN
JONES
JACKSON
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
STORY
MARSHALL
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6
2
(VI)
4
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1
CLINTON
CEDAR
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
JASPER
POWESHIEK
IOWA
JOHNSON
SCOTT
(XI)
4
(XI)
20
1
MUSCATINE
1
POTTAWATTAMIE
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA
KEOKUK
WASHINGTON
2
(XIII)
1
1
1
LOUISA
MILLS
MONTGOMERY
ADAMS
UNION
CLARKE
LUCAS
MONROE
WAPELLO
JEFFERSON
HENRY
DES MOINES
1
1
1
1
1
(XVI)
3
FREMONT
PAGE
TAYLOR
RINGGOLD
DECATUR
WAYNE
APPANOOSE
DAVIS
VAN BUREN
LEE
(XIV)
2
(XV)
1
3

FIGURE 3 - GEOGRAPHIC DISTRIBUTION OF SAMPLED IOWA FIRMS IN STANDARD INDUSTRIAL CLASSIFICATION 35

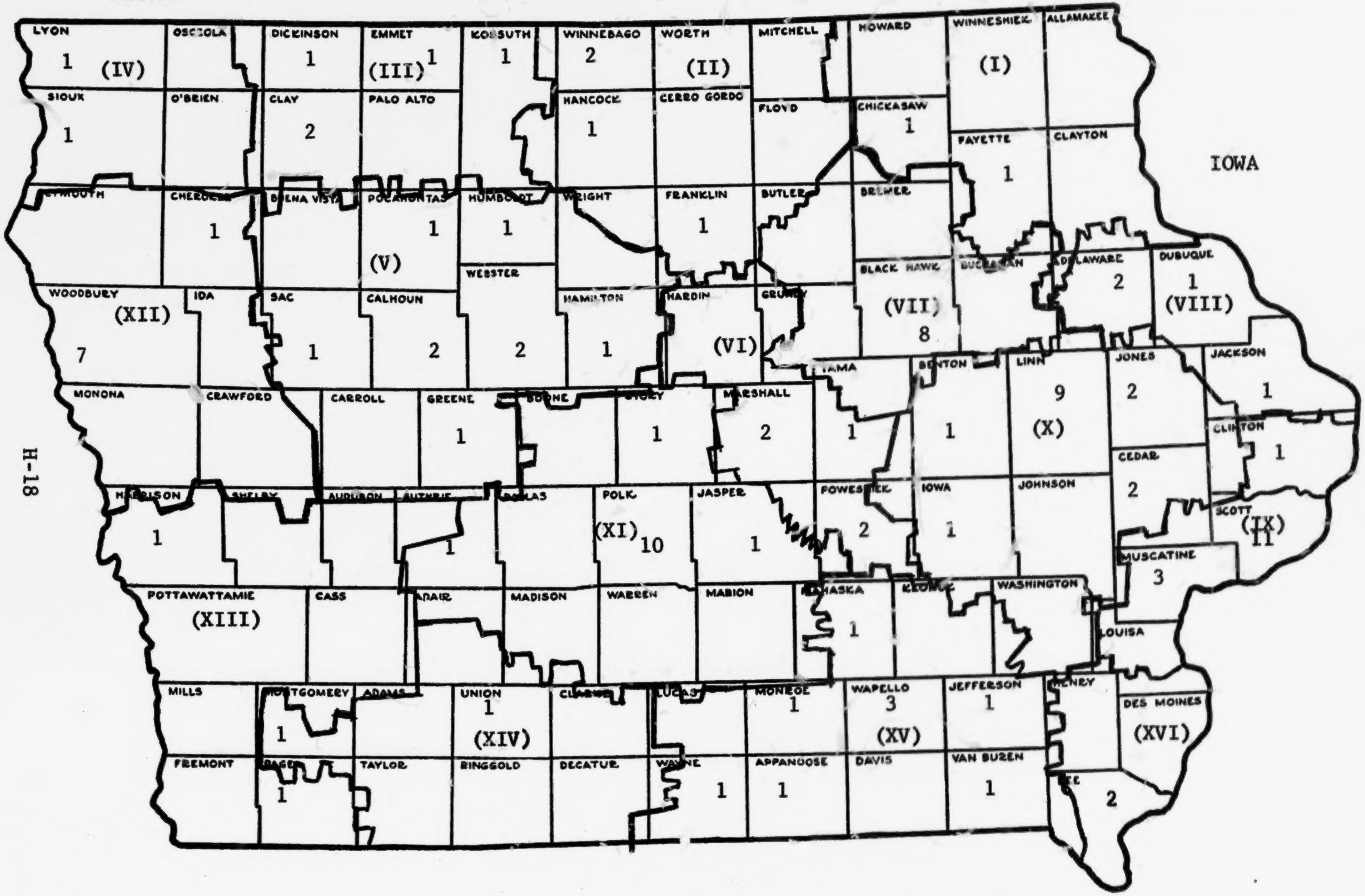
IOWA
LYON 1
(IV)
OSCEOLA
DICKINSON 1
EMMET 1
(III)
KOSSUTH 1
WINNEBAGO 2
WORTH
(II)
MITCHELL
HOWARD
WINNESHIEK
(I)
ALLAMAKEE
SIOUX 1
O'BRIEN
CLAY 2
PALO ALTO
HANCOCK 1
CERRO GORDO
FLOYD
CHICKASAW 1
FAYETTE 1
CLAYTON
PLYMOUTH
CHEROKEE 1
BUENA VISTA
POCAHONTAS 1
(V)
HUMBOLDT 1
WRIGHT
FRANKLIN 1
BUTLER
BREMER
BLACK HAWK
(VII)
8
BUCHANAN
DELAWARE 2
DUBUQUE 1
(VIII)
WOODBURY
(XII)
7
IDA
SAC 1
CALHOUN 2
WEBSTER 2
HAMILTON 1
HARDIN
(VI)
GRUNDY
TAMA 1
BENTON 1
LINN 9
(X)
JONES 2
JACKSON 1
MONONA
CRAWFORD
CARROLL
GREENE 1
BOONE
STORY 1
MARSHALL 2
CLINTON 1
CEDAR 2
SCOTT
(IX)
11
HARRISON 1
SHELBY
AUDUBON
GUTHRIE 1
DALLAS
POLK
(XI)
10
JASPER 1
POWESHIEK 2
IOWA 1
JOHNSON
MUSCATINE 3
POTTAWATTAMIE
(XIII)
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA 1
KEOKUK
WASHINGTON
LOUISA
MILLS
MONTGOMERY 1
ADAMS
UNION 1
(XIV)
CLARKE
LUCAS
MONROE 1
WAPELLO 3
(XV)
JEFFERSON 1
HENRY
DES MOINES
(XVI)
FREMONT
PAGE 1
TAYLOR
RINGGOLD
DECATUR
WAYNE 1
APPANOOSE 1
DAVIS
VAN BUREN 1
LEE 2

TABLE 6. ACTUAL FREQUENCY DISTRIBUTION OF SAMPLED FIRMS IN STANDARD INDUSTRIAL CLASSIFICATION 33 BY AREA AND BY SIZE

	AREA NUMBERS*															
Size by Workers	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Totals
A (1-20)	0	1	0	0	0	0	0	0	2	0	1	0	0	0	1	0	5
B (21-50)	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0	0	3
C (51-100)	0	0	0	0	1	0	0	0	1	1	0	0	0	0	1	0	4
D (101-250)	0	0	0	0	0	2	1	0	2	0	0	0	1	0	2	0	8
E (251-500)	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	2	6
F (501-1000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G (1001 or more)	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
TOTALS	0	1	0	0	1	4	1	0	8	2	1	0	2	1	4	2	27

* See figure one for area numbers and county locations.

TABLE 7. ACTUAL FREQUENCY DISTRIBUTION OF SAMPLED FIRMS IN STANDARD INDUSTRIAL CLASSIFICATION 34 BY AREA AND BY SIZE

	AREA NUMBERS*																
Size by Workers	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Totals
A (1-20)	1	2	1	0	1	1	2	3	2	3	6	2	2	1	2	2	31
B (21-50)	0	3	0	0	0	1	1	1	4	2	8	3	0	0	1	2	26
C (51-100)	0	0	0	0	0	0	0	0	0	2	0	0	0	1	1	0	4
D (101-250)	1	0	0	0	0	0	1	3	1	1	9	0	0	0	3	3	22
E (251-500)	0	0	0	0	0	0	0	2	0	1	1	0	0	0	0	0	4
F (501-1000)	0	0	0	0	0	1	1	0	1	1	0	0	0	0	0	0	4
G (1001 or more)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
TOTALS	2	5	1	0	1	4	5	9	8	10	24	5	2	2	7	7	92

* See figure two for area numbers and county locations.

TABLE 8. ACTUAL FREQUENCY DISTRIBUTION OF SAMPLED FIRMS IN STANDARD INDUSTRIAL CLASSIFICATION 35 BY AREA AND BY SIZE

										AREA NUMBERS*							
Size by Workers	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	Totals
A (1-20)	0	1	3	1	4	1	0	1	2	3	4	3	1	1	3	3	31
B (21-50)	0	1	1	0	1	0	2	0	3	0	1	1	0	0	0	0	10
C (51-100)	0	1	0	1	1	1	0	0	3	3	2	1	0	1	1	0	15
D (101-250)	1	0	1	0	2	3	3	1	4	2	0	2	1	0	2	0	22
E (251-500)	0	1	0	0	1	0	3	1	1	1	3	0	0	0	1	0	12
F (501-1000)	0	0	0	0	0	0	0	0	0	0	2	1	0	0	1	0	4
G (1001 or more)	0	0	0	0	0	0	1	1	2	4	1	0	0	0	1	1	11
TOTALS	1	4	5	2	9	5	9	4	15	13	13	8	2	2	9	4	105

* See figure three for area numbers and county locations.

For each of the Standard Industrial Classifications 33, 34, and 35, table 9, 10, and 11 give survey results for the Iowa metal trades workers who, because of firms sampled, came into the study. In each of the three tables full time and part time workers are listed. For employment in 1968, totals for male and female employees are shown. Projections to 1969 and 1971 are figures for total full time equivalent employment. These entries in the tables are shown for March 1, 1969, and March 1, 1971.

IV. DISCUSSION

In tables 12, 13, 14, 15, and 16 employment data are given by the sixteen Iowa educational areas and by occupation code which is explained below. Area numbers one through sixteen correspond to the areas shown in the three Iowa maps shown as figures one, two, and three.

These areas were designated for area vocational schools, or for area community colleges.

Briefly, the occupational codes used are as follows:

"0" stands for technicians
"5" stands for processing workers
"6" stands for machine trades workers
"7" stands for bench work occupations
"8" stands for structural and fabricating workers
"---7, 8, and 9" all stand for "bosses" of certain types (as explained on the tables).

The occupational code as used in these tables was developed by taking the first digit of The Dictionary of Occupational Titles (DOT) code number (these DOT numbers were used in the survey and are given in the Appendix). The code used in these tables has the following meaning:

1. -(blank); these are supervisors, superintendents, foremen, and inspectors which could not also be assigned to a particular DOT occupation group

2. 0; these are technical occupations involving engineering at varying degrees of sophistication

3. 5; these are processing occupations which include plating and foundry work

4. 6; these are machine trades occupations which include machining, gear making, turning, boring, and sawing

TABLE 9 - STANDARD INDUSTRIAL CLASSIFICATION
No. 33

PLANT SIZE	Full Time Male Employees 3/1/68	Full Time Female Employees 3/1/68	Total Full Time Employees 3/1/68	Part Time Male Employees 3/1/68	Part Time Female Employees 3/1/68	Total Part Time Employees 3/1/68	Total Full Time Employees 3/1/69	Total Full Time Employees 3/1/71
1	237	25	261	0	0	0	353	241
2	117	8	125	6	0	6	131	143
3	545	29	575	5	5	11	708	1166
4	1423	80	1503	17	1	18	1589	1617
5	2035	182	2217	9	2	12	2451	2587
6	0	0	0	0	0	0	0	0
7	3288	111	3399	0	0	0	3500	3550
Total	7644	435	8079	39	9	47	8732	9303

TABLE 10 - STANDARD INDUSTRIAL CLASSIFICATION
No. 34

PLANT SIZE	Full Time Male Employees 3/1/68	Full Time Female Employees 3/1/68	Total Full Time Employees 3/1/68	Part Time Male Employees 3/1/68	Part Time Female Employees 3/1/68	Total Part Time Employees 3/1/68	Total Full Time Employees 3/1/69	Total Full Time Employees 3/1/71
1	818	170	988	108	42	149	1365	1556
2	1158	287	1445	42	8	50	1740	2001
3	410	101	511	15	2	16	587	668
4	3136	680	3816	30	7	36	4282	4918
5	1075	310	1358	2	5	7	1625	1178
6	2997	624	3621	2	0	2	4199	4940
7	1965	454	2419	6	6	12	2600	2610
Total	11559	2626	14184	205	70	274	16399	17871

TABLE 11 - STANDARD INDUSTRIAL CLASSIFICATION
No. 35

PLANT SIZE	Full Time Male Employees 3/1/68	Full Time Female Employees 3/1/68	Total Full Time Employees 3/1/68	Part Time Male Employees 3/1/68	Part Time Female Employees 3/1/68	Total Part Time Employees 3/1/68	Total Full Time Employees 3/1/69	Total Full Time Employees 3/1/71
1	901	129	1029	158	46	203	1291	1536
2	510	66	577	28	0	28	633	708
3	1689	350	2039	9	35	44	2427	2760
4	3361	527	2887	39	9	48	4644	5330
5	3360	888	4248	3	4	7	4585	5238
6	1764	1265	3029	0	0	0	3135	3168
7	29943	4640	36463	1	8	9	37833	40022
Total	41527	9745	51272	237	102	339	54564	58761

TABLE 12 - FEMALE EMPLOYMENT, MARCH 1968

Occupation

AREA	0	5	6	7	8	---7* ---8 ---9
1	0	0	76	18	0	0
2	0	0	41	174	2	0
3	0	0	0	0	0	0
4	0	0	0	0	0	0
5	0	0	9	8	0	0
6	6	26	150	52	0	17
7	4	1	106	90	14	1
8	0	0	137	21	2	0
9	2	0	58	56	18	0
10	56	28	93	2410	170	0
11	2	5	199	546	18	0
12	0	0	8	9	0	0
13	0	0	11	14	0	0
14	0	14	2	68	0	0
15	0	50	95	285	23	0
16	0	0	8	21	0	0

*xxx.7 stands for a supervisor
xxx.8 stands for a foreman
xxx.9 stands for a superintendent

TABLE 13 - MALE EMPLOYMENT, MARCH 1968

Occupation

AREA	0	5	6	7	8	---7* ---8 ---9
1	16	27	61	50	0	0
2	26	16	159	34	41	2
3	15	7	97	36	43	0
4	13	5	57	0	21	0
5	19	25	308	254	146	0
6	264	470	1169	588	147	27
7	358	1692	3157	1322	300	1
8	281	132	1271	134	258	0
9	359	485	2500	653	298	0
10	1667	236	2088	1012	1185	22
11	193	87	1498	1163	992	38
12	71	37	369	138	171	0
13	32	96	132	37	27	0
14	21	108	153	11	5	14
15	182	142	1492	223	609	0
16	78	196	489	296	320	0

*xxx.7 stands for a supervisor
xxx.8 stands for a foreman
xxx.9 stands for a superintendent

TABLE 14 - NUMBER OF JOB VACANCIES, MARCH 1968

	Occupation					
AREA	0	5	6	7	8	---7* ---8 ---9
1	0	0	0	0	0	0
2	0	0	2	2	0	0
3	0	0	0	0	0	0
4	0	7	0	0	0	0
5	1	0	20	0	2	0
6	10	28	36	7	1	1
7	26	2	101	13	9	1
8	6	3	31	10	15	0
9	10	8	54	0	1	0
10	35	0	77	18	40	2
11	17	4	78	32	78	0
12	5	0	9	7	12	0
13	1	2	14	2	0	0
14	0	10	13	0	0	0
15	13	19	93	70	24	0
16	5	11	27	6	7	0

*xxx.7 stands for a supervisor
xxx.8 stands for a foreman
xxx.9 stands for a superintendent

TABLE 15 - ESTIMATED EMPLOYMENT IN 1971

Occupation

AREA	0	5	6	7	8	---7* ---8 ---9
1	28	52	227	134	2	0
2	19	16	279	229	34	2
3	21	7	139	59	46	0
4	16	15	82	4	33	0
5	35	34	448	326	180	0
6	362	543	2039	788	199	56
7	538	1752	4085	1581	418	4
8	314	191	1464	201	331	0
9	416	567	2977	610	399	0
10	1778	305	2745	2528	1690	30
11	257	132	2074	2107	1275	51
12	97	47	504	182	235	0
13	39	98	174	52	29	0
14	31	180	238	103	6	16
15	251	263	2177	668	887	0
16	116	242	584	365	361	0

*xxx.7 stands for a supervisor
xxx.8 stands for a foreman
xxx.9 stands for a superintendent

TABLE 16 - ESTIMATED EMPLOYMENT IN MARCH 1969

	Occupation					
AREA	0	5	6	7	8	---7* ---8 ---9
1	21	40	188	89	0	0
2	14	16	222	211	22	2
3	15	7	122	47	45	0
4	15	15	66	4	25	0
5	28	32	388	280	156	0
6	313	518	1417	734	177	49
7	423	1721	3699	1485	348	3
8	291	141	1481	151	290	0
9	389	550	2800	534	337	0
10	1604	274	2434	3522	1505	24
11	223	104	1968	1954	1210	38
12	80	47	454	165	213	0
13	38	104	161	50	29	0
14	26	153	209	100	6	14
15	204	221	1978	618	779	0
16	93	239	543	334	345	0

*xxx.7 stands for a supervisor
xxx.8 stands for a foreman
xxx.9 stands for a superintendent

5. 7; these are bench work occupations which include assembling, engraving, repairing, and painting

6. 8; these are structural work occupations which include metal fabricating, welding, and cutting

Table 17 shows technicians to be engaged mainly in production, research, and development. Most of the people in the other occupations were engaged in production. A small number were working in maintainance. Still fewer were in research and development.

Table 18 shows that, as expected, most of the technicians jobs fall in the technical category. The processing and bench work categories, which were the easiest to fill, also demanded the lowest skill level. A positive correlation appeared between the difficulty of filling a job and the level of skill which the job required.

Table 19 shows that firms tended to have a very difficult time filling technical occupations. The processing and bench work occupations were fairly easy to fill. The supervisory positions were also found easy to fill, possibly because often such jobs were filled from within the firm. Other job categories were found to be in an intermediate position with respect to ease of filling.

Table 20 shows processing and bench work occupations to be the only groups for which an eighth grade education, or less, is the most frequent minimum formal educational level for job entry. The possession of a high school diploma is a frequent entry requirement in occupations sampled. This may be partly due to a reflection of the policy of some firms to require a high school degree of all workers as they are hired. Expectations of promotion are then usually offered. The preponderance of an entry requirement of eighth grade or less in occupations, including technical, reflected an attitude shown by some firms that if a person can do a job the company will hire without considering formal education.

V. CONCLUSIONS

From data processed to date, one can conclude that the sampling technique and process of pre-education regarding the technique yielded high returns. The selection of the sample, the contact with manufacturers, and the use of skilled interviewers appears now to have been wise.

Occupational skill clusters in metal working trades can apparently be defined. The following tables, 21 through 25, together with analysis of their contents appears to emphasize the need for specific training in clusters of skills.

TABLE 17 - DEPARTMENTAL CLASSIFICATION OF JOB SAMPLED

Count

Occupation		Production	Maintainance	Research and Development	Production and Maintainance	Production and Research and Development	Maintainance and Research and Development	All Three
Supervisor	(-)	121.76	0	0	0	0	0	0
Technical	(0)	1,699.30	243.05	1,009.52	71.98	495.73	6.25	142.37
Processing	(5)	3,749.35	5.62	0	132.26	0	0	0
Machining	(6)	13,907.03	1,607.07	167.70	189.05	49.86	23.76	26.27
Benchwork	(7)	9,085.00	78.47	25.08	85.83	1.83	0	0
Structural	(8)	4,556.98	76.26	9.85	81.59	7.81	0	2.28

TABLE 18 - SKILL LEVEL OF JOBS

Occupation		Count			
		Technical	Skilled	Semi-skilled	Unskilled
Supervisor	(-)	2	47	70	0
Technical	(0)	2,976	509	181	0
Processing	(5)	42	573	1,561	1,710
Machining	(6)	240	5,231	8,768	1,755
Benchwork	(7)	44	955	4,403	4,311
Structural	(8)	52	2,288	0	0

TABLE 19 - IS THE JOB HARD TO FILL?

Occupation		Count Yes	No	Total
Supervisor	(-)	17.94	102.77	21
Technical	(0)	3,184.99	660	3,845
Processing	(5)	800.95	3,086	3,887
Machining	(6)	6,737.77	9,249.92	15,988
Benchwork	(7)	1,719	7,995.77	9,715
Structural	(8)	2,490.82	2,288	4,778

*The count is a frequency count on the number of jobs to which the answer, "Yes" or, "No," applied.

TABLE 20 - ACADEMIC EDUCATION FOR ENTRY TO SAMPLED JOBS

	Count				
Occupation	College Degree	Some College	High School Diploma	Some High School	8th Grade or Less
Supervisor (-)	0	2.10	118.52	1.14	0
Technical (0)	82.21	1,008.76	1,654.39	39.41	803.42
Processing (5)	29.79	20.31	922.73	293.48	2,626.72
Machining (6)	2.28	139.01	7,794.37	3,461.35	4,555.64
Benchwork (7)	0	15.51	3,118.81	1,499.70	5,092.18
Structural (8)	0	19.70	2,625.50	1,008.61	1,155.91

In interpreting table 21 one should note that the jobs which require a person to pass an entry exam reflect the policy of one large plant. This firm requires such exams of all its entrants. Remembering this, one finds that in technical occupations vocational training school is the most popular option. In the other groups the most common requirement is for no specific occupational training. In these groups the total of jobs requiring some sort of specific occupational training (except "pass entry exam") is close to the number of jobs in the group requiring no specific occupational training. The exceptions to this are the processing and bench work occupations where no specific vocational training is required.

Table 22 shows that most technical occupations which require vocational training for job entry require eighteen to twenty-four months of such training. Structural work occupations tend to require less than twelve months of vocational training. For the other occupational groups, the results are less clear cut and open to various interpretations.

Table 23 shows technicians to have the highest level of complexity of working with data because most of these jobs fall in the 0 to 2 range (details of the data, people, things hierarchy can be found in the Appendix). The next most complex occupation with respect to data is the supervisory group with most jobs falling in levels 2 or 3. Jobs in the remaining groups show a low level of complexity with most jobs falling at the 6 and 7 levels.

Table 24 shows the most common level of difficulty on the job to be associated with supervisors dealing with people, and this level of complexity carries an index of 5 (which is, as expected, supervising people). The levels for all other groups are lower. In general they lie between complexity levels of 6 and 8.

Table 25 shows technicians to be the only group with any significant lumping of complexity at the 1 level. All other groups show no significant grouping of values related to difficulty in working with things. This may reflect the large number of different types of jobs which are lumped into the same general group under "supervisory personnel."

TABLE 21 - SPECIFIC OCCUPATIONAL TRAINING FOR ENTRY TO SAMPLED JOBS

		Count							
Occupation	None	Vocational Training School (V.T.S.)	Previous Work Experience (P.W.E.)	V.T.S. or P.W.E.	V.T.S. and P.W.E.	Other	Prefer V.T.S. But Accept P.W.E.	Prefer P.W.E. But Accept V.T.S.	Pass Entry Exam
Supervisor (-)	78.11	16.80	23.13	0	3.72	0	0	0	0
Technical (0)	726.32	1,365.27	453.80	96.27	258.55	1.05	10.98	35.55	720.40
Processing (5)	3,189.33	92.92	325.87	61.68	4.56	47.88	0	0	138.00
Machining (6)	8,337.79	1,355.82	2,845.36	462.34	2,026.94	42.66	73.68	18.15	790.00
Benchwork (7)	5,501.20	48.53	553.23	89.22	281.82	18.30	178.14	0	3,042.00
Structural (8)	2,082.19	698.18	775.73	397.95	716.49	1.14	18.97	70.07	49.00

* The entry exam is lengthy, of several parts, and tests skills specific to a particular job.

TABLE 22 - THE USUAL LENGTH OF TIME IN OCCUPATIONAL TRAINING, WHEN IT IS REQUIRED FOR JOB ENTRY

Count

Occupation		No Specific Occupational Training Required	Less Than 6 Months	6-12 Months	12-18 Months	18-24 Months	More Than 24 Months	Don't Know
Supervisor	(-)	101.24	0	2.10	18.42	0	0	0
Technical	(0)	1,913.11	12.36	197.83	371.02	1,147.56	15.78	10.53
Processing	(5)	3,702.87	1.05	70.65	0	63.73	47.88	1.05
Machining	(6)	11,999.68	1,546.31	668.40	1,083.40	514.16	113.61	38.10
Benchwork	(7)	9,079.41	214.46	112.95	75.41	26.95	186.24	30.48
Structural	(8)	2,937.86	702.82	721.81	176.43	228.20	1.14	41.45

TABLE 23 - THE LEVEL OF JOB DIFFICULTY IN WORK ASSOCIATED WITH DATA

		Count on the Level of Relationship*							
OCCUPATION		0	1	2	3	4	5	6	7
Supervisors	(-)	0	2	39	51	2	0	27	0
Technician	(0)	889	592	1330	404	231	59	106	54
Processing	(5)	32	158	175	96	200	405	1125	1688
Machining	(6)	182	511	1804	751	2315	2678	4439	3210
Benchwork	(7)	338	124	125	845	1406	1753	2964	2097
Structural	(8)	32	149	454	123	873	312	1420	1406

*This is a frequency count of responses by occupational groups.

TABLE 24. THE LEVEL OF JOB DIFFICULTY IN WORK ASSOCIATED WITH PEOPLE

	Count of the Level of Relationship*								
Occupation	0	1	2	3	4	5	6	7	8
Supervisors (-)	0	0	19	3	24	32	23	24	0
Technicians (0)	78	543	593	141	26	522	1506	170	86
Processing (5)	35	26	59	144	0	9	1000	764	1848
Machining (6)	42	213	542	553	237	553	5806	3050	4894
Benchwork (7)	8	25	880	1206	50	374	2574	2432	2152
Structural (8)	18	33	188	64	6	500	1564	824	1570

* This is a frequency count of responses by occupational groups

TABLE 25. THE LEVEL OF JOB DIFFICULTY IN WORK ASSOCIATED WITH THINGS

Occupation	Count of the Level of Relationship*								
	0	1	2	3	4	5	6	7	8
Supervisors (-)	0	67	2	0	13	21	20	0	0
Technicians (0)	537	1717	275	199	434	201	19	104	179
Processing (5)	118	505	603	335	596	499	507	693	25
Machining (6)	4764	1740	1986	2570	1870	1436	885	591	49
Benchwork (7)	1422	880	706	208	1238	1751	2313	1066	119
Structural (8)	678	685	642	167	1224	447	425	476	23

* This is a frequency count of responses by occupational groups

VI. SUMMARY

Collection of occupational data by skill clusters using a sampling technique as illustrated and defined in this study seems to be an efficient use of professional workers' and lay leaders' time. A great deal of useful data can be gathered quickly under a study structured like this one. Planned additional work and analysis under this project will further the examination of the data, of the instrument, and of the cost of gathering and processing these data for decision-makers.

However, because technological progress and lack of co-ordinated plans for human resource development have resulted in critical discrepancies between supply and demand for workers with specific occupational skills, this study seemed urgently needed.

There is an imperative need in the State of Iowa for current occupational information which can be used in making decisions and planning for occupational curricula. The increased emphasis on the need for new and expanding vocational-technical education and the advent of area schools in Iowa have brought to the forefront a series of crucial unrelated factors for which educators must have answers as they go about a task of allocating resources and developing programs.

Appropriate occupational information needed to justify educational program decisions is not adequately available. This is a critical problem--its solution should have high priority because of the implications to educational program planning. Available occupational data, as a result of this study is greatly expanded and of high study is greatly expanded and of high value to vocational-technical educational planners.

The major problem was the development of procedures or techniques for periodic collection and maintenance of up-to-date occupational data responsive to changing conditions.

The purpose of this project was twofold:

1. To collect current occupational information on job vacancies by using sampling techniques.
2. To develop skill cluster classifications for occupations designed to aid in curriculum development for the teaching of similar competencies.

The objectives of the project are as follows:

1. To define selected occupational skill clusters in the metal working area.
2. To determine the industries comprising the population from which the sample will be drawn.

3. To develop a technique for drawing a sample from the population defined.
4. To develop an instrument for collection of the occupational data.
5. To interview the sample of selected industries.
6. To tabulate and analyze the results and make job projections.
7. To disseminate the information generated to planners of curricula and programs for vocational and technical schools and to cooperating agencies and industries.

Results of the survey technique indicate wide acceptance of the sampling procedure and interviewing procedure, by representatives of manufacturing firms contacted in the survey.

Results of the survey show: (1) growth and retraction trends exist in certain occupations within sampled firms, (2) hard-to-fill jobs exist in certain occupations within sampled firms, (3) training programs are desired by workers and employers, and (4) training programs within plant or school or both are means to advancement in the skilled job.

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APPENDIX

IOWA STATE UNIVERSITY
OF SCIENCE AND TECHNOLOGY
Ames, Iowa 50010

DEPARTMENT OF EDUCATION

March 12, 1968

Manager
Des Moines Steel Company
421 S.W. 5th St.
Des Moines, Iowa 50309

Dear Sir:

We request your help with a cooperative occupational skill survey. This survey is designed to furnish information regarding long range manpower needs of employers in Iowa. Of particular interest are occupations in which you are currently experiencing critical shortages of skilled and semiskilled workers. You will be contacted within a few weeks concerning the survey.

The occupational skill survey, planned for Iowa metalworking industries, will provide a report on manpower and training needs. Your firm is one in a random sample of approximately two hundred and fifty manufacturing concerns operating in Iowa to be interviewed.

The survey is being conducted by the Education Department and the Statistical Laboratory at Iowa State University, Ames, Iowa. This study, partially supported by a federal grant from the U. S. Office of Education, has the support and cooperation of the Vocational Education Branch of the Department of Public Instruction, the Iowa Manufacturers Association, and the Iowa Development Commission.

A schedule has been designed to record employment data of each company interviewed and for selected occupations only. We hope that you will be willing to work with the experienced interviewers of the Statistical Laboratory when a request is made for an appointment to visit your firm.

Your responses to the questions will be treated as strictly confidential. The data will be coded and processed electronically. Published materials will be released in such a manner that data relating to individual companies will not be identifiable. The estimates made will be available to planners of vocational and technical programs for area schools or community colleges, and to interested manufacturers.

Sincerely,

Norman V. Strand
Norman V. Strand
Professor of
Statistics

Robert W Thomas
Robert W. Thomas Jr.
Associate Professor
of Economics

Trevor G. Howe
Trevor G. Howe
Associate Professor
of Education

IOWA DEVELOPMENT COMMISSION

[illegible] HAROLD E. HUGHES
[illegible] CARROLL E. WORLAN

[illegible] JEWETT BUILDING
DES MOINES, IOWA [illegible]
TELEPHONE [illegible]
AREA CODE [illegible]

March 1, 1968

FROM: L. A. Touchae

RE: Iowa State University, Occupational Skill Survey

To Whom It May Concern:

The Iowa Development Commission is familiar with the survey technique which is being used in this skill survey and is most interested in the results. This information will be most valuable in the planning of training facilities and in forecasting manpower needs. We endorse this program.

We solicit your cooperation in this effort. We are satisfied that any information divulged will be treated in a confidential manner. The results of the survey will be presented in tabular, statistical form, without reference to the direct sources.

The results of this study will be available to you, and may be very valuable in the determination of your own training and manpower needs. Thank you for your consideration of this matter.

Sincerely,

L. A. Touchae

L. A. Touchae
Deputy Director

LAT/PHB/dd

[illegible]

State of Iowa
Department of Public Instruction
STATE OFFICE BUILDING
Des Moines, Iowa 50319

W. T. EDGREN
ASSOCIATE SUPERINTENDENT
ADMINISTRATION

PAUL F. JOHNSTON
SUPERINTENDENT

DAVID H. BECHTEL
ADMINISTRATIVE ASSISTANT

L. N. JENSEN
ASSISTANT SUPERINTENDENT
INSTRUCTION

DATE: March 8, 1968

FROM: Department of Public Instruction

SUBJECT: Iowa State University Occupational Skills Survey of Selected Iowa Manufacturing Concerns

To Whom It May Concern:

The Vocational Education Branch of the Department of Public Instruction must have current information relative to occupations in which qualified workers are most needed. Comprehensive information is needed in planning programs for providing post-high school and adult occupational education in area schools and community colleges. This type of occupational information is also important to youth interested in making informed career choices, to unemployed persons seeking job opportunities and to employers.

A statewide occupational skill survey is planned for Iowa metal-working industries to obtain a report on manpower and training needs. The survey is being conducted by the Education Department and Statistical Laboratory at Iowa State University, Ames, Iowa.

This study is designed to collect current occupational information by using a sampling technique. Personal interviews will be used to collect and record employment data from each company selected in the sample.

Interested department staff members concerned with the development of related programs have assisted with the planning and review of the survey instruments. This study is heartily endorsed by the department as it offers a new approach to the collection of data. The results should be very valuable in the development of future programs.

Sincerely yours,

Paul F. Johnston
State Superintendent of Public Instruction

Windol Wyatt
Associate Superintendent
Vocational Education Branch

Part I. Employer Data Sheet

March, 1968

IOWA STATE UNIVERSITY
Department of Education
and
Statistical Laboratory

OCCUPATIONAL SKILL SURVEY

Confidential Report. Information reported on this form is strictly confidential and will not be revealed to any person nor published in such a manner that data relating to individual companies can be identified.

1. ______________________ Name of local plant
2. ______________________ Street address
3. ______________________ City County
4. ______________________ Phone
5. ______________________ Name of parent company
6. ______________________ City State
7. ______________________ Name of person interviewed
8. ______________________ Title

______________________ Interviewer

______________________ Date Time

Company identification data

Plant Id. No. ______________

S.I.C. code ______________

Plant Size code ______________

Area code ______________

County code ______________

What is principal product manufactured or activity of your company?

____

TOTAL COMPANY EMPLOYMENT

		Full time	Part time
9. Number of persons on your payroll March 1, 1968	Male		
	Female		
	Total		
10. Total number of persons on your payroll now			
11. Total number of persons you estimate will be on your payroll ONE YEAR FROM NOW			
12. Total number of persons you estimate will be on your payroll THREE YEARS FROM NOW			

This is a confidential report on manpower and training needs. Would you please help me complete Part II by giving me the necessary information for each occupation listed in which you now employ workers or in which you expect to employ workers by March, 1969, or by March, 1971.

Time interview began ______________ Time interview ended ______________

Plant Id. No.

Part II. Occupational Employment Data Sheet

(1)	(2)	(3)	(4)		(5)	(6)		(7)
Line No.	D.O.T. Code No.	Occupational Job Title	Present employment (complete both columns)		Current number of job vacancies	Estimated employment in: (complete both columns)		Number of employees needed for replacement next year
			(a) Total Male	(b) Total Female		(a) March 1969	(b) March 1971	
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								

Page____ of ______

(8)		(9)				(10)			(11)				(12)		(13)			(14)				
Is this job vacancy hard-to-fill? (check one)		How would you classify this job regarding:							Job entry requirements													
		Skill level (check one)				Department (check one)			Academic education (check one)				Specific occupational training (check one)		Method of acquiring occupational training			Usual length of training in occupational skill (check one)				
(a)	(b)	(a)	(b)	(c)	(d)	(a)	(b)	(c)	(a)	(b)	(c)	(d)	(a)	(b)	(a)	(b)	(c)	(a)	(b)	(c)	(d)	(e)
Yes	No	Technical	Skilled	Semi-skilled	Unskilled	Production	Maintenance	Research & Development	Some college	H.S.diploma	Some H.S.	8th grade or less	Yes (go to 13)	No (go to 15)	Vocational training school Go to14	Previous work experience Go to 15	Other	Less than 6 months	6-12 months	12-18 months	18-24 months	Don't know

	(15)				(16)		(17)				(18)			(19)
	How is a beginner paid? (check one)				Pay rate		Supplemental occupational training				Rate job from simple to difficult (low=0, high=8) (rate each col.)			
	(a) Piecework	(b) Hourly	(c) Weekly (40 hr)	(d) Monthly	(a) Beginning	(b) Top pay	(a) Apprentice-ship	(b) In-plant	(c) On-the-job training	(d) Vocational training school	(a) Data	(b) People	(c) Things	Comments
1.														
2.														
3.														
4.														
5.														
6.														
7.														
8.														
9.														
10.														
11.														

DEPARTMENT OF EDUCATION
and
STATISTICAL LABORATORY
IOWA STATE UNIVERSITY

INTERVIEWER INSTRUCTIONS

OCCUPATIONAL SKILL SURVEY

March, 1968

TABLE OF CONTENTS

Page

YOUR JOB AND RESPONSIBILITIES 1

PROBLEM 1

PURPOSES 1

OBJECTIVES OF THE SURVEY 2

RULES FOR CALL BACKS AND SUBSTITUTIONS 2

DEFINITIONS OF TERMS 3

INTRODUCTORY REMARKS 5

FORMS TO BE USED:

1. Questionnaire:
    (a) Cover Sheet
    (b) Part II
2. Structured questions for Part II
3. S.I.C. 33 - Occupation job titles
    34 - Occupation job titles
    35 - Occupation job titles
4. 3 white flash cards re data, people and things
5. Daily activity sheet

THE COVER SHEET 5

DETAILED INSTRUCTIONS FOR COMPLETING PART II 6

ADMINISTRATION 10

YOUR JOB AND RESPONSIBILITIES

You are a representative of the Statistical Laboratory of Iowa State University for the duration of the survey. One of your responsibilities is to maintain good will from the beginning to the end of the interview.

The success of this survey depends upon your work in gathering the information. Many hours have been spent in preparing the interview schedule and instructions for each question. No set of instructions will cover every situation in the field, and we are depending on your common sense to deal with irregular cases. In all cases of doubt, list the details of the case on the interview schedule. However, the instructions provided in this manual should aid you in most phases of your work. Keep it with you and add notes as new situations arise and are solved.

All of our experience and all we have learned about making interview surveys have demonstrated that in the final showdown, the most important person connected with the survey is the interviewer. We can draw a good sample, design a good interview schedule, and make a highly competent analysis, but if the interviewer has not done her job well, the results of the survey will not be good. This is not to minimize the importance of the other phases of an interview survey, but so much depends on the skill with which the interviewer does her job that no effort should be spared to perfect the techniques and procedures of interviewing so that the results of the time and effort spent will be fully worthwhile.

Collection of Occupational Data by Skill Clusters Using a Sampling Technique

Problem: There is a critical need for up-to-date occupational data for planning and development of vocational and technical programs, particularly in recently established area vocational-technical schools. At this time, federally-collected job census data are available only to 1960. This is not recent enough for today's planning. Further, the Iowa Employment Security Commission presently collects information by industry, not be occupations. Detailed and specific data on occupations are, therefore, needed in educational and industrial planning. Many factors or variables such as inter-state and intra-state migration, military draft, new industry development, defense contracts and consruction, federal legislation and state and federal aid to education have caused rapid changes in the demand for and scarcity of trained labor.

The present major problem is development of procedures for periodic collection of up-to-date occupational data which shows Iowa's response to changing conditions in education and in the economy.

Purposes:

1. To collect current occupational information on specified job vacancies in selected manufacturing concerns by using sampling techniques, which are modern.

2. To develop, for specified occupations skill, cluster classifications that are designed to aid in curriculum development and industry planning.

Survey Objectives:

1. To define selected occupational skill clusters for specified metal working occupations.

2. To determine the nature of the industries comprising the population from which the sample was drawn.

3. To refine a technique for drawing a sample from the selected population.

4. To refine the questionnaire technique for collection of occupational data.

5. To interview the sample of selected industries:

    a. To determine job vacancies now and in the near future.

    b. To determine numbers and types of needed employees.

    c. To determine skills needed in selected occupations and methods of acquiring these skills.

    d. To determine educational levels and training associated with the selected occupations.

    e. To determine what and how workers in selected occupations are paid.

    f. To determine levels of difficulty for the selected occupations as rated on a "data," "people," and " things" scale which is scored from a low of 8 to a high of 0.

RULES FOR CALL BACKS AND SUBSTITUTIONS

You will be provided with a list containing the names and addresses of the firms you are to contact. Every effort should be made to complete an interview with each of these companies. There are no substitutions.

A letter from the Department of Education, Iowa State University, enclosing letters from the Vocational Education Branch in the Department of Public Instruction and The Iowa Development Commission was mailed to each respondent this week (March 20, 1968) explaining the project and asking for their cooperation when contacted by our interviewers. It is hoped this will be helpful.

Definitions of terms for the Interview Schedule

Plant Id. No.	This is a unique number identifying each industry. (This same number should be recorded on Part II of the schedule after "Plant Code No.")
S.I.C. Code	Standard Industrial Classification 33 - Primary Metal 34 - Fabricated metal products 35 - Machinery, except electrical
Plant size code	A - 1 to 20 employees B - 21 to 50 employees C - 51 to 100 employees D - 101 to 250 employees E - 251 to 500 employees F - 501 to 1000 employees G - 1000 and over
Area Code	Refers to the corresponding Area Community College, and will be coded at a later time. You need not fill this in.
County Code	The number assigned each county in the state

The following definitions are numbered to correspond to the column on the interview schedule.

Column 2 - D.O.T. Code No. - is the three digit code appearing in the Dictionary of Occupational Titles classifying the occupations selected for this study.

Column 3 - Occupational Job Title - is the title defined in the Dictionary listing the Occupational Group Arrangement of titles and codes according to their code numbers.

Column 9 - Skill levels are classed in four groups:
- (a) Technical - usually a technician with a knowledge of math and science and its application to his job.
- (b) Skilled - requiring a high degree of manipulative ability and experience, usually connected with a craft; is expected to make independent judgments and assume responsibility.
- (c) Semi-skilled - some skill and experience but not at the level expected of a craftsman.
- (d) Unskilled - requiring no special skill or training.

Column 10 - Departments:
- (a) Production - making, assembling or manufacture of goods or products.
- (b) Maintenance - workers engaged in keeping machines, systems and physical structures clean, orderly, lubricated and functioning.
- (c) Research & Development - engaged in planning new products (adapting, modifying and testing) for quality control and new markets.

Column 17 - Kinds of supplemental occupational training:

(a) Apprenticeship - a training period for a specified length of time under a master craftsman in a craft or trade, plus designated special instruction.

(b) In-plant training - a supplemental training provided by they employer for a specified group of employees, usually during working hours, and at no expense to the employee (but not an appreticeship).

(c) On-the-job-training - training provided to the employee (regardless of who finances it) in order that he may learn as he works. This would usually be provided for a beginner, but a certain amount of it is provided every new employee.

(d) Vocational training school - a "formal" vocational training school program to supplement his work. (This could be in the form of night school or part-time day.)

Column 18 - Personal or subjective ratings regarding the occupation

(a) Data - are information, knowledge, or concepts related to other data, people, or things. Data are obtained (like numbers) from counting, observing, or other means of collecting. Data are symbols, ideas, and concepts.

(b) People - are, obviously, human beings and hence work under this category relates to serving and aiding individuals and groups.

(c) Things - categories here deal with inanimate objects, substances, tools, machines, etc.

GENERAL EXPLANATION FOR CATEGORIES: Data People Things

Each of these three categories has an hierachy or difficulty.

Please stress that, for each classification, we want to record the highest (most complicated) level of difficulty in the hierachy for the class (either data, people, or things). For example, "synthesizing data" is the highest order of complexity for data. The same can be siad for "mentoring" under people, and for "setting-up" under things.

The information and the classification associated with "data," "people," and things" are based on the belief that every job requires a worker to function in relationship to data, people, and things in varying degrees of complexity are given on the cards: DATA, PEOPLE, THINGS.

INTRODUCTORY REMARKS

There are three parts to the introduction - stating your name, your connection with Iowa State University, and telling the purpose of your visit. You will have a letter of introduction from the Statistical Laboratory which you may use in case there seems to be some doubt in the respondent's mind about whom you represent.

The following is a suggested introduction:

> "I am from the Statistical Laboratory at Iowa State University. I think you received a letter from the Department of Education recently explaining the occupational skill survey for Iowa metal working industries that we are doing.
>
> I would appreciate it very much if I could talk with the person who is responsible for hiring and keeping personnel records for your company."

On the "cover sheet" provided for each business, we have filled in the name of the president, manager, owner, vice president or person in charge, and the company name and address. He is the man to whom the letter was addressed and most likely the one with whom you should make your first contact. If this is a small plant, it is most likely he will be able to complete the questionnaire for you. If the plant is larger and has a personnel man, you will probably be referred to him. It may be necessary to visit with the personnel man and advise him of the information you will need, make an appointment for a later date and return at that time to complete the questionnaire. If it is possible to complete the entire questionnaire in one call, that would certainly be desirable. We will leave this to your discretion.

A four-digit Standard Industrial Classification (S.I.C.) code number has been recorded on the ocver sheet for each company. The first two numbers of this code will direct you to the list of occupations to be used for that particular company. There is a short description given after each occupation on these lists. This should clarify each occupation for the resondent. Identical occupations do not necessarily appear on each list, although there may be some duplications. If a plant has employees working at allied occupations which are different than these, please write in these occupations, giving enough information about the occupations under Column 19 that a D.O.T. number can be assigned later in the office.

The first question to be asked is "What is the principal product manufactured or the activity of your company?" You may be given a product - or group of products - or an answer such as "job shop." If more than one "activity" record them but try to determine what per cent of business is attributed to each.

Question 9. Ask the total number of male and female employees in the company on March 1 not just the ones directly involved in metalworking. If there are part time employees, try to separate them from the full time employees.

Question 10. Then the total number of employees as of the date you are there. (This is not broken down by male and female.)

Question 11. What is the total number of persons you estimate will be on your payroll one year from now? Again full time and part time employees.

Question 12. What is the total number of persons you estimate will be on your payroll three years from now. These figures will of necessity be estimates, but if they have any idea of their expected growth this might be helpful, i.e. if they expected to increase their business 25% in the next 3 years, they would probably need 25% more employees at that time.

Detailed Instructions for Completing Part II of the Questionnaire

Since Part II is in the form of a table, we have provided you with a set of structured questions to be used when completing this form. Each question is identified by column number. Read the question as written and record the response on Part II in the appropriate column.

Before contacting the company, check the cover sheet to ascertain the S.I.C. list that applies to it, take 2 of these lists with you, give one to the respondent so he will be able to follow along with you and the 2nd one is for you to make notes on. The plant identification number should be noted on this sheet and as you go over these occupations with him, note "yes" or "no" as he tells you whether or not they have employees in each of these occupations. If he indicates they do have one or more employees in this occupation, go to Part II and record this D.O.T. number and the occupational job title and complete Columns 4 through 18 before you continue with the next occupation. The only occupations you will list will be the ones for which the company has employees. He may group 2 or 3 together for one employee. Try to ascertain which occupation takes the greatest amount of the employee's time and give it that D.O.T., but note the other D.O.T.'s beside this occupation. When the interview is completed, attach this list to your completed questionnaire to be mailed in. (Pick up the 2nd list to be used.) Take sufficient Part II's along to list all occupations of this company.

PART II - Questions to be asked to complete Columns 2 through 19

Column 2 and 3 "Do you have any employees whose job is classified as--------?"

(If YES, record the first three digits of the D.O.T. code in Column 2 and the occupation job title in Column 3, and complete Columns 4 through 19 before you ask about the next occupation.)

Column 4 "Can you tell me how many males and how many females you have employed at the present time in this occupation?"

(Record the number of columns (a) and (b) as indicated, or put a "zero" if none of one sex.)

Column 5 "What is the current number of job vacancies in this particular occupation?"

Column 6 "Could you make an estimate as to the number of persons you will have employed in this occupation in March, 1969? in March, 1971?"

Column 7 "How many employees for (occupation listed in Column 3) will be needed next year to replace those who leave the labor force for any reasons such as death, disability, promotion, retirement, entry into the Armed Forces, turnover, etc.?"

Column 8 "Would you say this job vacancy is hard-to-fill?"

(Might refer to a critical skill or short supply.) (Check yes or no.)

Column 9 "How would you classify this job regarding skill level? - technical, skilled, semi-skilled or unskilled?" (Check one)

Column 10 "How would you classify this job regarding department - in which department would the greatest amount of time be spent? - would it be in the production, maintenance, or research and development department?" (Check one)

Column 11 "In order for a person to be hired for this occupation, how much general education would be required? - some college, a high school diploma, some high school, or 8th grade or less?" (Check one)

Column 12 "Does this particular occupation require specific occupational training before you hire an employee?" (Check yes or no)

If YES, continue with Column 13. If NO, skip to Column 15.

Column 13 "You indicated that specific occupational training is required, what method is preferred for acquiring this occupational training? - vocational training school or through previous work experience? or some other, i.e. armed services?"

(One or more of these columns might be applicable - check respondent's answer.)

Column 14 (If (a) vocational training school is checked) - "What would be the usual length of training in occupational skills for this occupation: less than 6 months, 6 to 12 months, 12 to 18 months, or 18 to 24 months?"

(Check appropriate column.)

Column 15 "How is a beginner paid? - is he paid by piecework, hourly, weekly or monthly?"

(If different from 40 hour week please indicate.) (This does not apply to an experienced person just starting this job.) (Check one.)

(If this particular company has a different method of payment, write it across these columns - a through d.)

Column 16 "What is the usual rate of pay for a beginner in this occupation?"

(This should correspond with the method in Column 15.)

Column 17 "After an employee has started to work, is there any supplemental training that 'goes along' with this job while the employee is working in this occupation?"

(a) serving an apprenticeship?
(b) receiving in-plant training (but not as an apprentice)
(c) on-the-job training (regardless of who finances it)
(d) Vocational training school (may be night school)

(If any of this training is provided, check the appropriate column (s).)

Column 18 (Hand respondent the three white cards) "Could you rate this occupation in these three different categories for me? data, people and things? Note that "0" is the lowest or most simple and "8" is the highest or most difficult rating, with corresponding degrees of difficulty listed between. Look at the "Data" sheet -- which number would you say most closely describes this occupation?"

(Record the number in Column (a), and proceed with "people", and then "things" in the same manner.)

Column 19 Comments. This space is provided for you to make any notes regarding this occupation that might be helpful in classifying it, or to explain any entry in any of the columns which you feel may not be clear.

ADMINISTRATION

1. Salary, hours and method of payment

Each of the interviewers will furnish information to the University on the application forms. It is necessary to have a Social Security number. It will also be necessary to complete an income tax withholding exemption certificate.

Payment is made on an hourly basis. Allowable time includes training school, driving time and interviewing.

The pay period begins the 1st and 15 day of each month and ends the 15th and the last day of each month. Pay checks are issued on the 15th and last day of each month and will be mailed to your home from the Iowa State University Accounting Office. If you have any questions about the amount of either your pay check or your travel expense check, write to your supervisor or to the Survey Section, Statistical Laboratory. Do not write to the head of the department, or to the Accounting Office; this only delays looking into the matter for you.

2. Expenses

Car expenses. You will be paid a mileage allowance for miles traveled in connection with this study. Mileage expended for personal reasons will not be paid. This mileage allowance covers all expenses concerned with travel (i.e., gas, oil, tolls, parking meters and lots, etc., are all included in the per mile allowance).

Meals. If you are interviewing some distance from your home and it is more feasible from a time and mileage standpoint to eat your lunches out, this expense will also be allowed. On the same basis if you are some distance from home and have an evening appointment, the expenses for your evening meal will be allowed.

Lodging. If you are working 30 miles or less from your home, then you are not authorized lodging, and should return home after work. However, if the distance from your home is greater than 30 miles you should stay in a motel or hotel that has reasonable rates. In order to be reimbursed for this expense, obtain a receipt from the place where you stay and attach it to the Daily Log of Activities sheet. Enter the amount spent under the column marked "Expenses".... "Lodging".

Other expenses. These expenses include telephone, postage, etc. Itemize the expense. Receipts for "Other Expenses" of $1.00 or over are necessary for reimbursement.

3. Daily log of activities

This form provides a quick and easy record for all administrative matters. The time and mileage involved in these surveys provide the laboratory with information essential to survey designs - it is therefore important that the log be executed accurately. Entries should be made as each different activity is started. A new sheet (more if necessary) is to be used for each day of work.

Description of the entries to be made are:

State, County: Fill in the state and county in which you are working on the lines provided at the top of the Activities sheet.

Interviewer and date: Your name and the day and month of work.

Column (1), Time: Enter the time (to the nearest 5 minutes) for each activity entry. The first entry will be the start of the day's work; the last will be the end of the day's work. The end of the day's work means the time you finished editing, not the time you arrived at headquarters from the field work and then adding a note that _____minutes were spent editing. Also, we would like to have you bracket in the left-hand margin your time out for meals and other personal reasons. This will aid in checking the time worked, since the actual time out for personal reasons is not always indicated clearly in the column.

Column (2) Odometer reading: This space is provided for those activities involving travel.

Column (3), Description of Activity: Travel activities are:

a. To training school
b. From training school
c. From headquarters (home) to segment
d. From segment to lunch
e. From lunch to segment
f. From segment to headquarters (home)
g. From segment X to segment Y
h. To meet supervisor, etc.

Other activities include:

a. Interviewing
b. Training
c. Study
d. Reviewing and completing questionnaires (editing)
e. Supervisor meeting
f. Personal - Lunch, etc.

Column (4): Enter the Plant Id. No. assigned on the cover sheet.

Column (5): Enter the name of the company.

Column (6): Check "yes" or "no".

Column (7): Remarks. This space is provided for notations necessary to explain any of the activities. For example, reasons for a "No" entry in column (6) should be entered here. If an interview was unusually long due to some interruptions, please indicate this here; this information is used when we compile data on the time and cost per interview. Use this space also to distinguish between interviews with informants and interviews in which a questionnaire was completed.

Total time worked: Enter the total time worked for all allowable entries on the log sheet. This will be the total time you worked during the day covered by the log, excluding time for any personal activities. If your day's work covers more than one log sheet enter your total time, mileage and other expenses on the last sheet, please. Do not make such entries on all sheets for one day.

Chargeable mileage: Compute the total chargeable mileage for activites covered on the log and enter in this space. Do not include mileage expended for personal reasons. If any mileage entries on the log are for personal reasons, make a note below the chargeable mileage line to this effect.

Total interviews completed: Enter the total number of interviews you completed during the particular day of work covered by the log.

4. Miscellaneous

a. You should review your work daily. When you complete an interview you should review the schedule again.

b. You have been provided small envelopes in which to mail your daily logs. These should be mailed in every Saturday. For those that are in the office by Monday morning a check for your expenses will probably be mailed to you the end of the following week. Our address is: Statistical Laboratory, Survey Section, Service Building, Iowa State University, Ames, Iowa 50010.

c. You should contact your supervisor whenever any problems arise that are not covered in this manual. Your supervisor's job is to help you do a good job. Call our Ames office, phone 515-294-3143, reversing the charges. You may call us at home evenings, but be sure to (1) call person-to-person, and (2) ask that the call be charged to the office phone. Our home phone numbers are:

Hazel Cook	232-5628	
Roy Hichman	232-1342	
Trevor Howe	232-0756	(Office 294-6216)

STANDARD INDUSTRIAL CLASSIFICATION
NUMBER 33

TECHNICAL OCCUPATIONS:

Generally, and for occupations, listed below, think of a technician as a worker who is on an educational level between a skilled tradesman and a professional scientist, or engineer. His technical knowledge permits him to assume some duties formerly assigned to the graduate engineer, or scientist. For example, technicians may design a mechanism, compute the cost, write the specifications, organize the production, and test the finished product. (Source, p. 21 of: American Vocational Association, Committee on Publications, Definitions of Terms in Vocational, Technical, and Practical Arts Education, American Vocational Association, Inc., 1510 H Street N.W., Washington, D.C. 20005. Pp. 23.)

003.1 Electrical Technician

A technician concerned with applying electrical theory and related subjects to test and modify developmental or operational electrical machinery and electrical control equipment and circuitry in industrial or commercial plants and laboratories.

003.2 Electronic Technician

A technician associated with a computer laboratory or with instrumentation and development, or electronic communications, or with systems testing.

003.3 Instrumentation Technician

A technician who devises, sets up, and operates electronic instrumentation and related electromechanical or electrohydraulic apparatus involved in operational and environmental testing of mechanical, structural, or electrical equipment, translating test data for subsequent use by engineering personnel in making engineering design and evaluation decisions.

007.1 Tool Designer

007.2 Die Designer

A highly skilled craft or trade in which general and special tools are planned and designed and their dies are created. These craftsman are concerned with application of principles of physics and engineering in regard to utilization of heat and mechanical power for design and production of tools and machines. Specifically, these craftsman might be concerned with power tools, instrumentation, or machine design.

007.3 Mechanical Technician

A technician concerned with engineering, experimentation, or laboratory development related to mechanical and engineering problems which apply principles of physics and engineering for the generation, transmission, and utilization of heat and mechanical power, and for the design and production of tools and machines.

Typical specializations are power generation and transmission, hydraulics, instrumentation, heating, and ventilating, air conditioning, machine design and research.

007.4 Draftsman, Mechanical
A technician doing drafting and lay-out work for castings, tool design and related activities. The work of a mechanical draftsman is generally associated with drafting and lay-out for tool and machine production, such as a tool-design draftsman.

012 Industrial Technician
A technician who studies and records time, motion, methods, and speed involved in performance of maintenance, production, clerical, and other worker operations to establish standard production rate and to improve efficiency.

022 Chemical (Laboratory) Technician
A technician doing chemical tests, such as a laboratory tester. Technicians in this group are concerned for research and testing related to chemical and physical properties and compositional changes of substances. Specialization generally occurs in one or more than one branch of chemistry, such as organic, inorganic, or physical chemistry.

NOTE: Supervisors carry "7" as a fourth digit (i.e., 500.7); foremen carry "8" as a fourth digit (i.e., 500.8); and superintendents carry "9" as a fourth digit (i.e., 500.9). This holds for all listings other than technical.

PROCESSING OCCUPATIONS:
Generally, for these occupations think of jobs concerned with refining, mixing, chemically treating, molding, casting, or otherwise processing metals. These occupations include those concerned with covering surfaces by electrodeposition or electrolysis.

502 Melting, Pouring, Casting, and Related Occupations
A worker who melts a metal then pours it into a mold or other receptacle. An example is a blast-furnace keeper.

510 Mixing and Related Occupations
A worker who combines mineral ore with solvents or other amalgams to produce a single mass or compound. An example is a mixer tender.

511 Separating, Filtering, and Related Occupations
A worker who is concerned with separating desirable materials from ore by physical and electrical means such as filtering, centrifugal force, flotation, electrolysis, distillation, etc. An example is a rotary-drier operator or dust operator.

512 Melting Occupations
A worker who melts ore concentrate or metal for combining with other materials, refining, and preparing for casting. An example is a furnaceman.

513 Roasting Occupations

A worker who is concerned with heating ore and concentrates in a furnace with free access of air to eliminate sulfur. An example is a Herreshoff-Roaster operator.

514 Pouring and Casting Occupations

A worker who is concerned with pouring, injecting, centrifuging, or pressing molten or powdered metal into a mold or other receptacle and permitting it to solidify. An example is a metal pourer.

515 Crushing and Grinding Occupations

A worker who is concerned with reducing ore or concentrate from larger to smaller particles. An example is an ore crusher.

518 Molders, Coremakers, and Related Occupations

A worker who is concerned with making molds or cores to be used in casting metal in a foundry. An example is a mold maker.

519 Ore Refining and Foundry Occupations, n.e.c.

A group of workers who are in occupations not classified elsewhere, but concerned with refining ore, ore concentrate, pig, or scrap and casting metal in a foundry, as chipping and grinding.

599 Dip-painting

MACHINE TRADES OCCUPATIONS:

Generally, occupations here deal with feeding, tending, operating, controlling, and setting up machines to work on raw materials. The relationship of the worker to the machine is important. Coordination of eye and hand are important. Repair, maintenance, and installation are important. Think of occupations associated with shaping metal parts and products.

600 Machinists and Related Occupations

A worker who is concerned with shaping metal parts by milling, turning, planing, abrading, boring, clipping, sawing, and shaving with a variety of metal tools, and includes laying-out, job setting, fitting, assembling, and repairing.

601 Toolmakers and Related Occupations

A worker who is concerned with the entire scope of construction, repairing, maintaining, and calibrating machine-shop tools, jigs, fixtures, instruments, and metal-forming dies. An example is a die maker.

609 Metal Machining Occupations, n.e.c.

Workers in this group have occupations, not elsewhere classified, concerned with shaping metal parts or products by removing excess material from stock or objects. An example is a sheet-steel inspector, thread grinder.

610 Hammer Forging Occupations

Workers in this group have occupations concerned with heating metal and hammering it into desired shape with a hand or power hammer. An example is a drop forger.

611 Press Forging Occupations

A worker here is concerned with heating metal in a forge and shaping it by means of a press. An example is a press operator.

612 Forging Occupations, n.e.c.

Workers here have occupations not elsewhere classified, concerned with shaping and conditioning metal, including shaping without heat by such means as machines with rollers. An example is a hammersmith or die-set-up man.

613 Sheet and Bar Rolling Occupations

A worker here is concerned with reducing the cross-sectional area and elongating metal pieces by passing them between rollers which exert a continuous compressive force. An example is a rolling-mill operator.

617 Forming Occupations, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with shaping metal by the application of machine pressure. An example is a hydraulic-press operator.

619 Miscellaneous Metalworking Occupations, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with shaping and conditioning metal by such means as rolling, forging, extruding, blanking, and pressworking. An example is a rolling foreman.

620 Motorized Vehicle and Engineering Equipment Mechanics and Repairmen

A worker here is concerned with repairing gasoline and diesel-powered engines and accessories, other mechanical parts of motorized vehicles including materials-handling equipment. An example is a garage mechanic.

626 Metalworking Machinery Mechanics

A worker here is concerned with repairing general purpose and specialized metal-cutting and metal-forming machines, accessories, and related equipment. An example is a hydraulic-press serviceman.

637 Utilities Service Mechanics and Repairmen

A worker here is concerned with installing, maintaining, and repairing mechanical equipment and appliances used to supply heat, conditioned air, refrigeration, water, and related utilities. An example is a quality control technician.

638 Miscellaneous Occupations in Machine Installation and Repair

A worker here is concerned with machine installation and repair who has not been covered in other categories listed in this series, of machine trades occupations. An example is a millwright.

BENCH WORK OCCUPATIONS:

Generally, occupations here are concerned with the use of body members to operate hand tools and bench machines. Think of occupations concerned with fabricating, repairing, reconditioning, machine setting, blueprint reading, and following patterns using a variety of hand tools or bench machines.

741 Painters, Spray

A worker here is concerned with covering or decorating surfaces, using spray guns and stencils. An example is an enamel sprayer.

STRUCTURAL WORK OCCUPATIONS:

Generally, occupations here are concerned with fabricating, erecting, installing, painting, and repairing working structures or parts of structures. Customarily, these are workers dealing with outside-of-factory activities related to metals, glass, etc. These workers need to know materials and their stresses and strains. Think of fabricating, trestles, towers, bridges, drilling rigs, airframes, boilers, and storage tanks.

810 Arc Welders

A worker here is concerned with welding using electric welding equipment with current across an air gap between the workpiece and an electrode. An example is a multiple spot welder.

811 Gas Welders

A worker here is concerned with welding, using gas-welding equipment. An example is an oxyacetylene welder.

812 Combination Arc Welders and Gas Welders

A worker here is concerned with welding, using gas and arc welding equipment. An example is a casting repair welder.

816 Flame Cutters and Arc Cutters

A worker here is concerned with severing or trimming materials, using gas-flame or electric-arc cutting equipment. An example is a gas-cutting-machine operator.

819 Welders, Flame Cutters, and Related Occupations, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with welding, brazing, soldering, lead burning, cutting, and related activities. An example is a weld inspector.

STANDARD INDUSTRIAL CLASSIFICATION
NUMBER 34

TECHNICAL OCCUPATIONS:

Generally, and for occupations listed below, think of a technician as a worker who is on an educational level between a skilled tradesman and a professional scientist, or engineer. His technical knowledge permits him to assume some duties formerly assigned to the graduate engineer, or scientist. For example, technicians may design a mechanism, compute the cost, write the specifications, organize the production, and test the finished product. (Source, p.21 of: American Vocational Association, Committee on Publications, Definitions of Terms in Vocational, Technical, and Practical Arts Education, American Vocational Association, Inc., 1510 H Street N.W., Washington, D.C. 20005. Pp. 23.)

003.1 Electrical Technician

A technician concerned with applying electrical theory and related subjects to test and modify developmental or operational electrical machinery and electrical control equipment and circuitry in industrial or commercial plants and laboratories.

003.2 Electronic Technician

A technician associated with a computer laboratory or with instrumentation and development, or electronic communications, or with systems testing.

003.3 Instrumentation Technician

A technician who devises, sets up, and operates electronic instrumentation and related electromechanical or electrohydraulic apparatus involved in operational and environmental testing of mechanical, structural, or electrical equipment, translating test data for subsequent use by engineering personnel in making engineering design and evaluation decisions.

007.1 Tool Designer

007.2 Die Designer

A highly skilled craft or trade in which general and special tools are planned and designed and their dies are created. These craftsmen are concerned with application of principles of physics and engineering in regard to utilization of heat and mechanical power for design and production of tools and machines. Specifically, these craftsmen might be concerned with power tools, instrumentation, or machine design.

007.3 Mechanical Technician

A technician concerned with engineering, experimentation, or laboratory development related to mechanical and engineering problems which apply principles of physics and engineering for the generation, transmission, and utilization of heat and mechanical power, and for the design and production of tools and machines.

Typical specializations are power generation and transmission, hydraulics, instrumentation, heating, and ventilating, air conditioning, machine design and research.

007.4 Draftsman, Mechanical

A technician doing drafting and lay-out work for castings, tool design, and related activities. The work of a mechanical draftsman is generally associated with drafting and lay-out for tool and machine production, such as a tool-design draftsman.

012 Industrial Technician

A technician concerned with the design and installation of integrated systems of personnel, materials, machinery and equipment.

Specializations are plant lay-out, production methods, and standard cost control, quality control, methods, production, and safety engineering.

022 Chemical (Laboratory) Technician

A technician doing chemical tests, such as a laboratory tester. Technicians in this group are concerned for research and testing related to chemical and physical properties and compositional changes of substances. Specialization generally occurs in one or more than one branch of chemistry, such as organic, inorganic, or physical chemistry.

NOTE: Supervisors carry "7" as a fourth digit (i.e., 500.7); foremen carry "8" as a fourth digit (i.e. 500.8); superintendents carry "9" as a fourth digit (i.e., 500.9). This holds for all listings other than technical.

PROCESSING OCCUPATIONS:

Generally, for these occupations think of jobs concerned with refining, mixing, chemically treating, molding, casting, coating, or otherwise processing metals. These occupations include those concerned with covering surfaces by electrodeposition or electrolysis.

500 Electroplating Occupations

A worker here is concerned with covering the surfaces of objects by electrodeposition or electrolysis. An example is an electroplater apprentice.

501 Dip Plating Occupations

A worker here is concerned with covering, without electrolysis, the surfaces of objects with metal coatings by immersion in molten liquid, or solute form of the coating metal, or in materials which react with the object surface to form the metal coating. An example is a foreman of hot-dip training.

503 Pickling, Cleaning, Degreasing, and Related Occupations

Workers in this group have occupations concerned with cleaning metal objects (generally with an acid bath) to remove coatings of grease, scale, tarnish, oxide, etc. An example is a pickler operator.

504 Heat-treating Occupations

A worker here is concerned with subjecting metal to heat, cold, or chemicals to relieve or redistribute stresses and affect such characteristics as hardness, flexibility, and ductility. An example is a gear hardner.

599 Dip-painting

MACHINE TRADES OCCUPATIONS:

Generally, occupations here deal with feeding, tending, operating, controlling, and setting up machines to work on raw materials. The relationship of the worker to the machine is important. Coordination of eye and hand are important. Repair, maintenance, and installation are important. Think of occupations associated with shaping metal parts and products.

600 Machinists and Related Occupations

A worker who is concerned with shaping metal parts by milling, turning, planing, abrading, boring, clipping, sawing, and shaving with a variety of metal tools, and includes laying-out, job-setting, fitting, assembling, and repairing.

601 Toolmakers and Related Occupations

A worker who is concerned with the entire scope of construction, repairing, maintaining, and calibrating machine-shop tools, jigs, fixtures, instruments, and metal-forming dies. An example is a die maker.

602 Gear Machining Occupations

A worker here is concerned with shaping metal gears by any combination of milling, turning, planing, abrading, boring, chipping, sawing or shaving. An example is a gear grinder.

603 Abrading Occupations

A worker here is concerned with smoothing, polishing, or sharpening metal objects by the wearing-away action of abrasives or machine files. An example is a tool sharpener.

604 Turning Occupations

A worker here is concerned with shaping metal by the paring or chipping action of rigid cutting tools to metal rotating on a lathe. An example is an automatic-screw-machine operator.

605 Milling and Planing Occupations

A worker here is concerned with removing excess metal by the action of a revolving multiple-tooth cutter, thus producing flat or profiled surfaces, grooves, and slots. An example is a milling-machine set-up operator.

606 Boring Occupations

A worker here is concerned with piercing metal by means of rotary-cutting tools advanced into the material in the direction of the tool's axis to make, enlarge, or thread a hole. An example is a drill-press operator.

607 Sawing Occupations

A worker here is concerned with severing or shaping metal with a saw-toothed or abrasive-edged blade or disk. An example is a sawing-machine operator.

609 Metal Machining Occupations, n.e.c.

Workers in this group have occupations, not elsewhere classified, concerned with shaping metal parts or products by removing excess material from stock or objects. An example is a sheet-steel inspector, thread grinder.

610 Hammer Forging Occupations

Workers in this group have occupations concerned with heating metal and hammering it into desired shape with a hand or power hammer. An example is a drop forger.

611 Press Forging Occupations

A worker here is concerned with heating metal in a forge and shaping it by means of a press. An example is a press operator.

612 Forging Occupations, n.e.c

Workers here have occupations not elsewhere classified, concerned with shaping and conditioning metal, including shaping without heat by such means as machines with rollers. An example is a hammersmith or a die-set-up-man.

613 Sheet and Bar Rolling Occupations

A worker here is concerned with reducing the cross-sectional area and elongating metal pieces by passing them between rollers which exert a continuous compressive force. An example is a rolling-mill operator.

615 Punching and Shearing Occupations

A worker here is concerned with making holes in metal by cutting out a circular wad under pressure from a die whose hole is slightly larger than the diameter of the punch; and cutting or shearing metal by the action of a keen-edged cutting tool. An example is a punch-press operator.

615.1 Punching Occupations Only

615.2 Shearing Occupations Only

616 Fabricating Machine Operators

A worker here is concerned with shaping, fitting, and assembling metal parts. An example is a wire weaver, fabricating-machine-operator.

617 Forming Occupations, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with shaping metal by the application of machine pressure; an example being a hydraulic-press operator.

619 Miscellaneous Metalworking Occupations, n.e.c

Workers here have occupations, not elsewhere classified, concerned with shaping and conditioning metal by such means as rolling, forging, extruding, blanking, and pressworking. An example is a rolling foreman.

620 Motorized Vehicle and Engineering Equipment Mechanics and Repairmen

A worker here is concerned with repairing gasoline and diesel-powered engines and accessories, other mechanical parts of motorized vehicles including materials-handling equipment. An example is a garage mechanic.

626 Metalworking Machinery Mechanics

A worker here is concerned with repairing general purpose and specialized metal-cutting and metal-forming machines, accessories, and related equipment. An example is a hydraulic-press serviceman.

637 Utilities Service Mechanics and Repairmen

A worker here is concerned with installing, maintaining, and repairing mechanical equipment and appliances used to supply heat, conditioned air, refrigeration, water, and related utilities. An example is a quality control technician.

638 Miscellaneous Occupations in Machine Installation and Repair

A worker here is concerned with machine installation and repair who has not been covered in other categories listed in this series of machine trades occupations. An example is a millwright.

BENCH WORK OCCUPATIONS:

Generally, occupations here are concerned with the use of body members to operate hand tools and bench machines. Think of occupations concerned with fabricating, repairing, reconditioning, machine setting, blueprint reading, and following patterns using a variety of hand tools or bench machines.

703 Occupations in Assembly and Repair of Sheet-metal Products, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with laying-out, cutting, shaping, and fitting sheet metal to assemble or repair sheet metal parts and items, but these are not structural sheet metal workers. An example is a template cutter.

704 Engraving Occupations

706 Metal Unit Assemblers and Adjusters, n.e.c

Workers here have occupations, not elsewhere classified, concerned with assembling and adjusting nonelectrical metal units or components including mechanical assembling or adjusting not requiring overall mechanical knowledge. An example is a solderer-assembler.

709 Miscellaneous Occupations in Fabrication, Assembly, and Repair of Metal Products, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with fabricating, assembly, and repairing metal products. An example is a hand riviter, inspector.

740 Painters, Brush
A worker here is concerned with covering or decorating surfaces using brushes. An example is a lacquerer.

741 Painters, Spray
A worker here is concerned with covering or decorating surfaces, using spray guns and stencils. An example is an enamel sprayer.

STRUCTURAL WORK OCCUPATIONS:
Generally, occupations here are concerned with fabricating, erecting, installing, painting, and repairing working structures or parts of structures. Customarily, these are workers dealing with outside-of-factory activities related to metals, glass, etc. These workers need to know materials and their stresses and strains. Think of fabricating, trestles, towers, bridges, drilling rigs, airframes, boilers, and storage tanks.

800 Riveters
A worker here is concerned with joining structural shapes and members by rivets. An example is a pneumatic riveter.

801 Fitting, Bolting, Screwing, and Related Occupations
A worker here is concerned with joining structural parts and components with bolts, screws, or related fasteners. An example is a compressor assembler.

804 Tinsmiths, Coppersmiths, and Sheet Metal Workers
A worker here is concerned with laying-out, cutting-to-size, bending or shaping, and soldering, brazing, riveting, or crimping sheet metal to fabricate or repair sheet metal items. An example is a sheet-metal-shop helper.

805 Boilermakers
A worker here is concerned with assembling, erecting, and repairing boilers and related equipment and includes laying-out, cutting, fitting, and bolting, welding, or riveting heavy metal plates, boiler tubes, and castings. An example is a boilermaker.

809 Miscellaneous Occupations in Metal Fabricating, n.e.c.
Workers here have occupations, not elsewhere classified, concerned with fabricating structures from metal and from related materials. An example is a sheet-metal-shop foreman.

810 Arc Welders
A worker here is concerned with welding using electric welding equipment with current across an air gap between the workpiece and an electrode. An example is a multiple spot welder.

811 Gas Welders
A worker here is concerned with welding, using gas-welding equipment. An example is an oxyacetylene welder.

812 Combination Arc Welders and Gas Welders

A worker here is concerned with welding, using gas and arc welding equipment. An example is a casting repair welder.

813 Resistance Welders

A worker here is concerned with welding equipment that passes an electric current through workpiece to achieve welding temperature and jointure without filler material. An example is a spot welder.

814 Brazing, Braze-welding, and Soldering Occupations

A worker here is concerned with brazing, braze-welding, or soldering using electric or gas-fired ovens and equipment. An example is a brazing-machine operator.

815 Lead Burning Occupations

A worker here is concerned with fusing, joining, or shaping lead parts, such as tank linings, pipe, and battery posts, using a gas torch. An example is a lead-burner apprentice.

816 Flame Cutters and Arc Cutters

A worker here is concerned with severing or trimming materials, using gas-flame or electric-arc cutting equipment. An example is a gas-cutting-machine operator.

819 Welders, Flame Cutters, and Related Occupations, n.e.c

Workers here have occupations, not elsewhere classified, concerned with welding, brazing, soldering, lead burning, cutting, and related activities. An example is a weld inspector.

STANDARD INDUSTRIAL CLASSIFICATION
NUMBER 35

TECHNICAL OCCUPATIONS:

Generally, and for occupations listed below, think of a technician as a worker who is on an educational level between a skilled tradesman and a professional scientist, or engineer. His technical knowledge permits him to assume some duties formerly assigned to the graduate engineer, or scientist. For example, technicians may design a mechanism, compute the cost, write the specifications, organize the production, and test the finished product. (Source, p. 21 of: American Vocational Association, Committee on Publications, Definitions of Terms in Vocational, Technical, and Practical Arts Education, American Vocational Association, Inc., 1510 H Street N.W., Washington, D.C. 20005. Pp. 23.)

003.1 Electrical Technician

A technician concerned with applying electrical theory and related subjects to test and modify developmental or operational electrical machinery and electrical control equipment and circuitry in industrial or commercial plants and laboratories.

003.2 Electronic Technician

A technician associated with a computer laboratory or with instrumentation and development, or electronic communications, or with systems testing.

003.3 Instrumentation Technician

A technician who devises, sets up, and operates electronic instrumentation and related electromechanical or electrohydraulic apparatus involved in operational and environmental testing or mechanical, structural, or electrical equipment, translating test data for subsequent use by engineering personnel in making engineering design and evaluation decisions.

007.1 Tool Designer

007.2 Die Designer

A highly skilled craft or trade in which general and special tools are planned and designed and their dies are created. These craftsmen are concerned with application of principles of physics and engineering in regard to utilization of heat and mechanical power for design and production of tools and machines. Specifically, these craftsmen might be concerned with power tools, instrumentation, or machine design.

007.3 Mechanical Technician

A technician concerned with engineering, experimentation, or laboratory development related to mechanical and engineering problems which apply principles of physics and engineering for the generation, transmission, and the utilization of heat and mechanical power, and for the design and production of tools and machines.

Typical specializations are power generation and transmission, hydraulics, instrumentation, heating, and ventilating, air conditioning, machine design and research.

007.4 Draftsman, Mechanical
A technician doing drafting and lay-out work for castings, tool design, and related activities. The work of a mechanical draftsman is generally associated with drafting and lay-out for tool and machine production, such as a tool-design draftsman.

012 Industrial Technician
A technician who studies and records time, motion, methods, and speed involved in performance of maintenance, production, clerical, and other worker operations to establish standard production rate and to improve efficiency.

022 Chemical (Laboratory) Technician
A technician doing chemical tests, such as a laboratory tester. Technicians in this group are concerned for research and testing related to chemical and physical properties and compositional changes of substances. Specialization generally occurs in one or more than one branch of chemistry, such as organic, inorganic, or physical chemistry.

NOTE: Supervisors carry "7" as a fourth digit (i.e., 500.7); foremen carry "8" as a fourth digit (i.e., 500.8); superintendents carry "9" as a fourth digit (i.e., 500.9). This holds for all listings other than technical.

PROCESSING OCCUPATIONS:
Generally, for these occupations, think of jobs concerned with refining, mixing, chemically treating, molding, casting, coating, or otherwise processing metals. These occupations include those concerned with covering surfaces by electrodeposition or electrolysis.

503 Pickling, Cleaning, Degreasing, and Related Occupations
Workers in this group have occupations concerned with cleaning metal objects (generally with an acid bath) to remove coatings of grease, scale, tarnish, oxide, etc. An example is a pickler operator.

504 Heat-treating Occupations
A worker here is concerned with subjecting metal to heat, cold, or chemicals to relieve or redistribute stresses and affect such characteristics as hardness, flexibility, and ductility. An example is a gear hardner.

599 Dip-painting

MACHINE TRADES OCCUPATIONS:
Generally, occupations here deal with feeding, tending, operating, controlling, and setting up machines to work on raw materials. The

relationship of the worker to the machine is important. Coordination of eye and hand are important. Repair, maintenance, and installation are important. Think of occupations associated with shaping metal parts and products.

600 Machinists and Related Occupations
A worker who is concerned with shaping metal parts by milling, turning, planing, abrading, boring, clipping, sawing, and shaving with a variety of metal tools, and includes laying-out, job setting, fitting, assembling, and repairing.

601 Toolmakers and Related Occupations
A worker who is concerned with the entire scope of construction, repairing, maintaining, and calibrating machine-shop tools, jigs, fixtures, instruments, and metal-forming dies. An example is a die maker.

602 Gear Machine Occupations
A worker here is concerned with shaping metal gears by any combination of milling, turning, planing, abrading, boring, chipping, sawing, or shaving. An example is a gear binder.

604 Turning Occupations
A worker here is concerned with shaping metal by the paring or chipping action of rigid cutting tools to metal rotating on a lathe. An example is an automatic-screw-machine operator.

605 Milling and Planing Occupations
A worker here is concerned with removing excess metal by the action of a revolving multiple-tooth cutter, thus producing flat or profiled surfaces, grooves, and slots. An example is a milling-machine set-up operator.

606 Boring Occupations
A worker here is concerned with piercing metal by means of rotary cutting tools advanced into the material in the direction of the tools axis to make, enlarge, or thread a hole. An example is a drill-press operator.

607 Sawing Occupations
A worker here is concerned with severing or shaping metal with a saw-toothed or abrasive-edged blade or disk. An example is a sawing-machine operator.

609 Metal Machining Occupations, n.e.c
Workers in this group have occupations, not elsewhere classified, concerned with shaping metal parts or products by removing excess material from stock or objects. An example is a sheet-steel inspector, thread grinder.

610 Hammer Forging Occupations
Workers in this group have occupations concerned with heating metal and hammering it into desired shape with a hand or power hammer. An example is a drop forger.

611 Press Forging Occupations

A worker here is concerned with heating metal in a forge and shaping it by means of a press. An example is a press operator.

615 Punching and Shearing Occupations

A worker here is concerned with making holes in metal by cutting a circular wad under pressure from a die whose hole is slightly larger than the diameter of the punch; and cutting or shearing metal by the action of a keen-edged cutting tool. An example is a punch-press operator.

615.1 Punching Occupations Only

615.2 Shearing Occupations Only

616 Fabricating Machine Operators

A worker here is concerned with shaping, fitting, and assembling metal parts. An example is a wire weaver, fabricating-machine-operator.

617 Forming Occupations, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with shaping metal by the application of machine pressure. An example is a hydraulic-press operator.

619 Miscellaneous Metalworking Occupations, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with shaping and conditioning metal by such means as rolling, forging, extruding, blanking, and pressworking. An example is a rolling foreman.

620 Motorized Vehicle and Engineering Equipment Mechanics and Repairmen

A worker here is concerned with repairing gasoline and diesel-powered engines and accessories, other mechanical parts of motorized vehicles including materials-handling equipment. An example is a garage mechanic.

626 Metalworking Machinery Mechanics

A worker here is concerned with repairing general purpose and specialized metal-cutting and metal-forming machines, accessories, and related equipment. An example is a hydraulic press serviceman.

637 Utilities Service Mechanics and Repairman

A worker here is concerned with installing, maintaining, and repairing mechanical equipment and appliances used to supply heat, conditioned air, refrigeration, water, and related utilities. An example is a quality control technician.

638 Miscellaneous Occupations in Machine Installation and Repair

A worker here is concerned with machine installation and repair who has not been covered in other categories listed in this series of machine trades occupations. An example is a millwright.

BENCH WORK OCCUPATIONS:

Generally, occupations here are concerned with the use of body members to operate hand tools and bench machines. Think of occupations concerned with fabricating, repairing, reconditioning, machine setting, blueprint reading, and following patterns using a variety of hand tools or bench machines.

704 Engraving Occupations

706 Metal Unit Assemblers and Adjusters, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with assembling and adjusting nonelectrical metal units or components, including mechanical assembling or adjusting not requiring overall mechanical knowledge. An example is a solderer-assembler.

709 Miscellaneous Occupations in Fabrication, Assembly, and Repair of Metal Products, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with fabricating, assembly, and repairing metal products. An example is a hand riveter, inspector.

740 Painters, Brush

A worker here is concerned with covering or decorating surfaces using brushes. An example is a lacquerer.

741 Painters, Spray

A worker here is concerned with covering or decorating surfaces, using spray guns and stencils. An example is an enamel sprayer.

STRUCTURAL WORK OCCUPATIONS:

Generally, occupations here are concerned with fabricating, erecting, installing, painting, and repairing working structures or parts structures. Customarily, these are workers dealing with outside-of-factory activities related to metals, glass, etc. These workers need to know materials and their stresses and strains. Think of fabricating, trestles, towers, bridges, drilling rigs, airframes, boilers, and storage tanks.

801 Fitting, Bolting, Screwing, and Related Occupations

A worker here is concerned with joining structural parts and components with bolts, screws, or related fasteners. An example is a compressor assembler.

810 Arc Welders

A worker here is concerned with welding using electric welding equipment with current across an air gap between the workpiece and an electrode. An example is a multiple spot welder.

811 Gas Welders

A worker here is concerned with welding, using gas-welding equipment. An example is an oxyacetylene welder.

812 Combination Arc Welders and Gas Welders

A worker here is concerned with welding, using gas and arc welding equipment. An example is a casting repair welder.

814 Brazing, Braze-welding, and Soldering Occupations

A worker here is concerned with brazing, braze-welding, or soldering using electric or gas-fired ovens and equipment. An example is a brazing-machine operator.

816 Flame Cutters and Arc Cutters

A worker here is concerned with severing or trimming materials, using gas-flame or electric-arc cutting equipment. An example is a gas-cutting-machine operator.

819 Welder, Flame Cutters, and Related Occupations, n.e.c.

Workers here have occupations, not elsewhere classified, concerned with welding, brazing, soldering, lead burning, cutting, and related activities. An example is a weld inspector.

DATA (4th digit)

0. No significant relationship to data
1. Comparing data
2. Copying data
3. Computing data
4. Compiling data
5. Analyzing data
6. Coordinating data
7. Synthesizing data

Data are information, knowledge, or concepts related to other data, people, or things. Data are obtained (like numbers) from counting, observing, or other means of collecting. Data are symbols, ideas, and concepts.

1. Comparing Data: Does the job require comparing; for example, different readings or sets of figures? These data compared are easily and readily observable characteristics of other data, of people, or of things.

2. Copying Data: Does the job require entering; for example, sets of numbers or posting figures?

3. Computing Data: Does the job require performing arithmetic operations or carrying out action related to such operations?

4. Compiling Data: Does the job require gathering or classifying information about other data or about people or things? Reporting or carrying out a course of action related to information compiled is frequently involved at this level.

5. Analyzing Data: Does the job require examining and evaluating data? Presenting alternative courses of action is often involved at this level of difficulty.

6. Coordinating Sets of Data: Does the job require the determination of time, place, and sequence of activities and operations based on data? Is there action to be taken based on analysis? Is there reporting of events?

7. Synthesizing Data: Does the job require integrating many sets of data? Are integrated analyses required for discovery of new data or to develop knowledge or interpret collections of data?

PEOPLE (5th digit)

0. No significant relationship to people
1. Serving people
2. Speaking-signaling to people
3. Persuading people
4. Diverting people
5. Supervising people
6. Instructing people
7. Negotiating with people
8. Mentoring people

People are, obviously, human beings and hence work under this category relates to serving and aiding individuals and groups.

1. Serving People: Jobs requiring attending to the needs of others, responding on request and responding immediately, fall at this level.
2. Speaking-signaling to People: Jobs requiring talking or signaling to exchange information are here.
3. Persuading People: Jobs which require one to influence others (as selling a product) fall here.
4. Diverting People: A job which requires amusing people falls here.
5. Supervising People: Jobs which include determining or interpreting work procedures for groups of workers fall here.
6. Instructing People: Jobs which require teaching of subject matter to others are at this level.
7. Negotiating with People: Jobs here deal with exchange of ideas, information, and opinions. Policies and programs are formulated at this level.
8. Mentoring People: Jobs here have to do with dealing with the total personality of someone or group. Jobs dealing with the total person so as to advise, counsel, or guide someone relative to legal, scientific, clinical, or spiritual matters are included under mentoring.

THINGS (6th digit)

0. No significant relationship to things
1. Handling things
2. Feeding-offbearing things
3. Tending things
4. Manipulating things
5. Driving-operating things
6. Operating-controlling things
7. Precision working with things
8. Setting-up things

Categories here deal with inanimate objects, substances, tools, machines, etc.

1. Handling Things: Jobs requiring handling, carrying, and delivering tools and materials fall here. Few or no divisions regarding standards are made here.

2. Feed-offbearing Things: Jobs of inserting, guiding, or placing materials in machines fall here.

3. Tending things: Jobs of starting, stopping, and observing equipment fall here. Little or no judgment is required to make adjustments.

4. Manipulating Things: Jobs requiring judgment about tool selection and use fall here.

5. Driving-operating Things: Jobs requiring starting, stopping, and manipulating machines (like a crane operator) belong here.

6. Operating-controlling Things: Jobs requiring starting and stopping equipment, controlling temperatures and other variables would fall at this level.

7. Precision Working Things: If the job requires responsibility for standards and requires judgment in meeting those production standards, this is its level of difficulty.

8. Setting-up Things: If the job requires adjusting machines by replacing parts or altering tools, the job has this level of difficulty about it. This level of difficulty requires setting-up equipment for other workers.

DATA CODE SHEETS (CARD NUMBER 1)

COLUMN NUMBER	NUMBER OF DIGITS	DESCRIPTION
1	1	Card Type – (1) Employer data card
2-4	3	Plant Identification number
5-8	4	SIC Code - classification drawn
9	1	Plant size code (drawn) 1-A 2-B 3-C 4-D 5-E 6-F 7-G
10	1	Plant size code (actual) (size classification as indicated by the total of full-time workers) 1-A 2-B 3-C 4-D 5-E 6-F 7-G
11-12	2	Area Code - numbered one throu sixteen
13-14	2	County Code - counties 1 through 99
15-16	2	Number of occupation cards for the employer
17-20	4	Full-time male employees, March 1, 1968

(CARD NUMBER 1)

COLUMN NUMBER	NUMBER OF DIGITS	DESCRIPTION
21-23	3	Full-time female employees, March 1, 1968
24-26	3	Part-time male employees, March 1, 1968
27-28	2	Part-time female employees, March 1, 1968
29-32	4	Total full-time employees, March 1, 1968
33-35	3	Total part-time employees, March 1, 1968
36-39	4	Total full-time workers now
40-42 v	3	Total part-time workers now
43-46	4	Total full-time workers on payroll in one year
47-49	3	Total part-time workers on payroll in one year
50-53	4	Total full-time workers on payroll in three years
54-56	3	Total part-time workers on payroll in three years

(CARD NUMBER 2)

COLUMN NUMBER	NUMBER OF DIGITS	DESCRIPTION
1	1	Card Type - (2) Occupational data card
2-4	3	Plant Identification (Code) number
5-8	4	SIC Code - classification drawn
9	1	Plant size code (drawn) 1-A 2-B 3-C 4-D 5-E 6-F 7-G
10	1	Plant size code (actual) (size classification as indicated by the total of full-time workers) 1-A 2-B 3-C 4-D 5-E 6-F 7-G
11-12	2	Area code - numbered one through sixteen
13-14	2	County code - counties 1 through 99
15-16	2	Number of occupation cards for the employer
17-18	2	What number this card carries on the "n" occupation cards for this employer
19-20	4	Principal DOT Code number (Check occupation sheets for fourth digit)

(CARD NUMBER 2)

COLUMN NUMBER	NUMBER OF DIGITS	DESCRIPTION
23-26	4	DOT Code number (second)
27	1	Proportion of time in tenths spent on the first job (Let 0 = 100% of time and other integers be the amount of time, in tenths)
28	1	How many occupations has this employer with the same DOT number
29	1	Which card is this of the "n" occupation in the same DOT classification
30-33	4	Present employment, males (include one place to right of decimal: xxx.x)
34-37	4	Present employment, females (include one place to right of decimal: xxx.x)
38-39	2	Current number of job vacancies
40-42	3	Estimated employment, March 1969
43-45	3	Estimated employment, March 1971
46-48	3	Number of employees needed for addition and replacement next year
49	1	Is job hard-to-fill? 1 = yes; 2 = no
50	1	Classify job by skill level (1) technical (2) skilled (3) semi-skilled (4) unskilled

(CARD NUMBER 2)

COLUMN NUMBER	NUMBER OF DIGITS	DESCRIPTION
51	1	Classify job according to department (1) production (2) maintainance (3) R & D (4) 1 & 2 (5) 1 & 3 (6) 2 & 3 (7) all these
52	1	Academic education (1) college degree (2) some college (3) H. S. diploma (4) some H. S. (5) 8th grade or less
53	1	Specific occupational training (1) none (2) voc. training school (3) previous work exp. (4) either 2 or 3 (5) both 2 & 3 (6) other (7) prefer 2 but accept 3 (8) prefer 3 but accept 2 (9) pass entry exams
54	1	Usual length of training time in occupational skill (1) not applicable (2) less than 6 months (3) 6 - 12 months (4) 12 - 18 months (5) 18 - 24 months (6) more than 24 months (7) don't know
55	1	How is worker paid? (1) piecework (2) hourly (3) weekly (40 hour) (4) monthly
56-61	6	Beginning pay rate (xxxx.xx)
62-67	6	Top pay rate (xxxx.xx) Supplemental occupational training
68	1	Are any checked? 1 = only one; 2 = none, and 3 = more than one

(CARD NUMBER 2)

COLUMN NUMBER	NUMBER OF DIGITS	DESCRIPTION
69	1	Apprenticeship (blank) No (1) Yes, no other yes (2) Yes, combined with another yes (3) Yes, as an alternative for another yes
70	1	In-plant (blank) No (1) Yes, no other yes (2) Yes, combined with another yes (3) Yes, as an alternative for another yes
71	1	On-the-job (blank) No (1) Yes, no other yes (2) Yes, combined with another yes (3) Yes, as an alternative for another yes
72	1	Vocational training school (blank) No (1) Yes, no other yes (2) Yes, combined with another yes (3) Yes, as an alternative for another yes
73	1	Job difficulty with data 0 - 7 1 - 6 2 - 5 3 - 4 4 - 3 5 - 2 6 - 1 7 - 0
74	1	Job difficulty with people 0 - 8 1 - 7 2 - 6 3 - 5 4 - 4 5 - 3 6 - 2 7 - 1 8 - 0
75	1	Job difficulty with things 0 - 8 1 - 7 2 - 6 3 - 5 4 - 4 5 - 3 6 - 2 7 - 1 8 - 0

(CARD NUMBER 2)

COLUMN NUMBER	NUMBER OF DIGITS	DESCRIPTION
76	1	Length of work week 1 - 40 hour 2 - 35-39 hour 3 - 30-34 hour 4 - 24-29 hour 5 - Less than 24 hour 6 - 41-44 hour 7 - 45-48 hour 8 - 49-52 hour 9 - more than 52 hour
77	1	Comments (blank) No (1) Incentive pay (2) Overtime work (with higher pay) is a part of the job (3) Extra pay for night shifts (4) Vocational training paid for by company and taken at employees option in night school (5) Profit sharing plan (6) Company pays for part of approved vocational training (7) Bonus (8) More than one of the above

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TITLE

Collection of Occupational Data by Skill Clusters using a Sampling Technique.

PERSONAL AUTHOR(S)

Trevor G. Howe, Robert W. Thomas, James J. Mikesell

INSTITUTION (SOURCE)

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ABSTRACT

Technological progress and lack of co-ordinated plans for human resource development have brought critical problems in supply and demand for skilled workers. Iowa needs current occupational information to justify educational programs and changes in these. This research has, therefore, the objective of developing a sampling technique for generation of skill information.

Firms from three Standard Industrial Classifications were sampled. Skille interviewers completed a data instrument for occupations by means of interviewi a representative of each firm in the sample.

Procedures for collection and analysis are being refined.